Zebra 105*SL*™

User's Guide

Customer order # 11342L
Manufacturer part # 11342LB Rev. 2

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- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different than that to which the receiver is connected.
- Consult the dealer or an experienced Radio/TV technician for help.

NOTE: This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance.

"The user is cautioned that any changes or modifications not expressly approved by Zebra Technologies Corporation could void the user's authority to operate the equipment."

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I have determined that the Zebra printer identified as the

105*SL*™

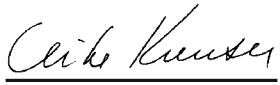
manufactured by:

Zebra Technologies Corporation
333 Corporate Woods Parkway
Vernon Hills, Illinois 60061-3109 U.S.A.

has been shown to comply with the applicable technical standards of the FCC

for Home, Office, Commercial, and Industrial use

if no unauthorized change is made in the equipment,
and if the equipment is properly maintained and operated.



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Introduction

Hello!

Thank you for purchasing this high-quality Zebra 105*SL*™ printer, manufactured by the industry leader in quality, service, and value — Zebra Technologies Corporation. For over 25 years, Zebra has provided customers with the highest caliber of products and support.

- This manual provides all of the information you need to operate your printer.
- The *ZPL II*® *Programming Reference Volumes I and II* (part # 45540L) show you how to create the perfect label format for your application. The guide also explains how ZBI™ extends the power of ZPL II by allowing custom programs to be written that operate within the printer, directly interfacing with, for example, bar code scanners and keyboard display devices. The guide also contains information about the enhanced operating system features of your printer. There are three ways to obtain these books: on the accessory CD-ROM (supplied with the printer), on our web site (www.zebra.com), or by ordering printed manuals from your distributor.
- *The ZebraNet*® *Networking: PrintServer II*™ *Installation and User's Guide* (part # 45537L) explains how you can quickly set up your printer on an IP network and experience ZebraLink™, our revolutionary real-time connectivity and control solution for Zebra printers (optional ZebraNet® PrintServer II required).
- The maintenance manual for your printer (part # 32056L) contains the information you need to maintain your printer.

Unpacking and Inspection

Carefully unpack and inspect the printer for damage:

- Check all exterior surfaces.
- Raise the media access door and inspect the media compartment.

Save the carton and all packing material in case the printer needs to be shipped. Contact your authorized Zebra reseller for instructions.

Reporting Damage

If you discover shipping damage:

- Immediately notify the shipping company and file a report with them. *Zebra Technologies Corporation is not responsible for any damage incurred during shipment of the equipment and will not repair this damage under warranty.*
- Keep the carton and all packing material for inspection.
- Notify your authorized Zebra reseller.

Storage

If you are not placing the printer into operation immediately, repackage it using the original packing materials. The printer may be stored under the following conditions:

- Temperature: –40° to +140° F (–40° to +60° C)
- Relative humidity: 5% to 85% non-condensing

Media and Ribbon Requirements

Since print quality is affected by media and ribbon, printing speeds, and printer operating modes, it is very important to run tests for your applications.

We STRONGLY RECOMMEND the use of Zebra Technologies Corporation-brand supplies for continuous high-quality printing. A wide range of paper, polypropylene, polyester, and vinyl stock has been specifically engineered to enhance the printing capabilities of the printer and to ensure against premature printhead wear.

- Continuous roll media, fanfold media, or card stock with optional perforations and registration holes may be used.
- Printhead life may be reduced by the abrasion of exposed paper fibers when using perforated media.
- The ribbon MUST be as wide as or wider than the media being used. If the ribbon is narrower than the media, areas of the printhead will be unprotected and subject to premature wear. (When printing in direct thermal mode, ribbon is not used and should not be loaded in the printer.)

Power Cord

WARNING: For personnel and equipment safety, always use a three-prong plug with a ground (earth) connection.

NOTE: Depending on how your printer was ordered, a power cord may or may not be included. If one is not included, or if the one included is not suitable for your requirements, refer to “Power Line Cord Specifications” on page 97.

The power cord connector must be plugged into the mating connector on the rear of the printer.

Make sure that the POWER on/off switch (located at the back of the printer) is in the “off” position before connecting the power cable to an electrical outlet.

Printer Anatomy 101

Figure 1 outlines the basic components of your printer. Depending on the installed options, your printer may look slightly different.

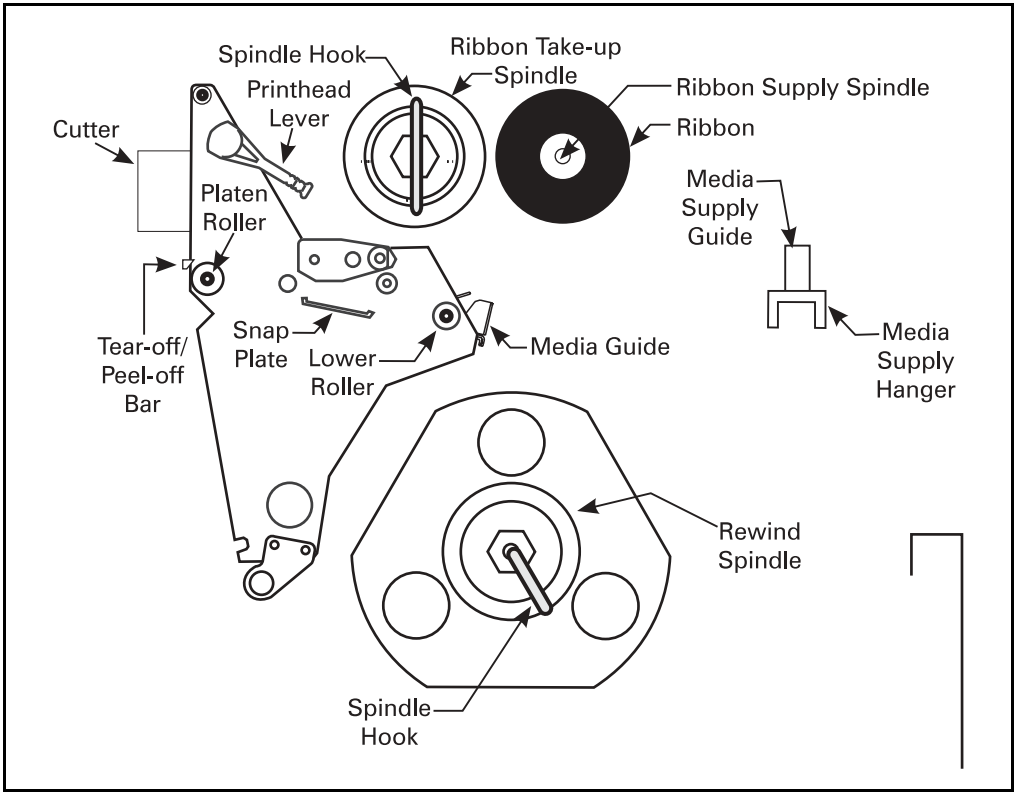


Figure 1

Calibrating the Printer

This chapter of the user's guide is *so* important that we've printed it on a different color paper! That way, it will be easy for you to find when you must calibrate (set up) the printer for your particular application.

Purpose

- To calibrate the printer.
- To verify that the printer is properly set up by printing a test label.

NOTE: This procedure *must* be performed when the printer is first installed or if it cannot properly detect the top of the label.

To calibrate the printer, you must perform the following procedures:

- Determine the **type of media** (labels) being used.
- Choose the **print method**.
- Position the **media sensors** (if necessary).
- **Configure the printer and software or driver** based on the label being used.
- Perform a **media and ribbon calibration**.
- Print a **test label.**

Types of Media

Non-Continuous Web Media

Non-continuous web media (refer to Figure 2) refers to individual labels that are separated by a gap, notch, or hole. When you look at the media, you can tell where one label ends and the next one begins.

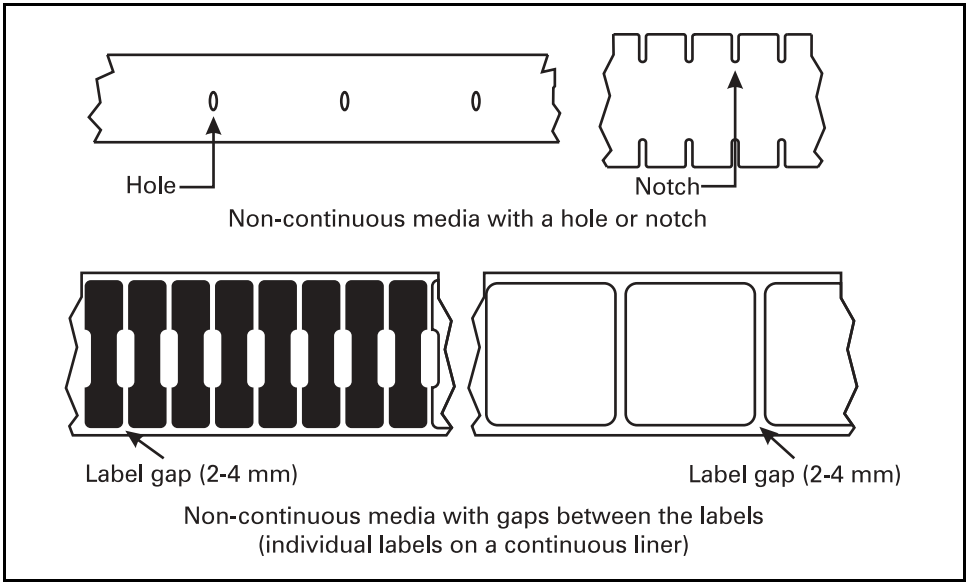

Hole
Notch
Non-continuous media with a hole or notch
Label gap (2-4 mm)
Label gap (2-4 mm)
Non-continuous media with gaps between the labels
(individual labels on a continuous liner)

Figure 2

Non-Continuous Black Mark Media

Non-continuous black mark media has black marks printed on the back of the liner material that indicate the start and end of each label (refer to Figure 3).

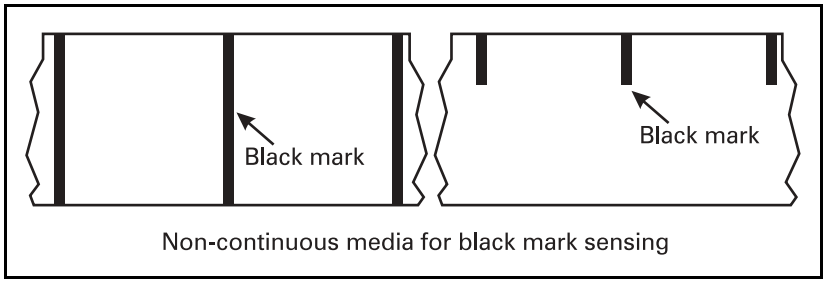


Figure 3

Continuous Media

Continuous media (refer to Figure 4) is one uninterrupted roll of material that allows the image to be printed anywhere on the label.

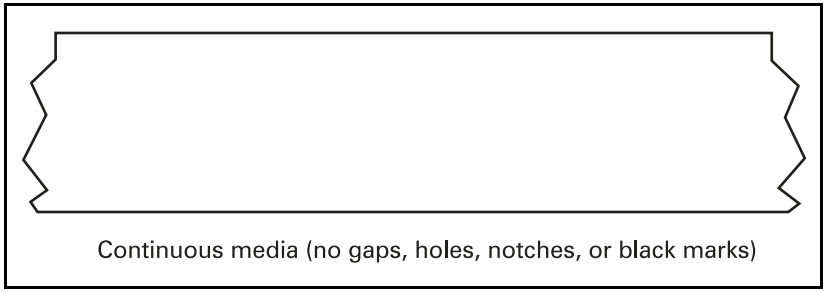


Figure 4

Choosing the Print Mode

- In **Tear-Off** mode, each label (or a strip of labels) can be torn off after it is printed.
- In **Peel-Off** mode, backing material is peeled away from the label as it is printed. After this label is removed from the printer, the next one is printed.
- In **Cutter** mode, the printer automatically cuts the label after a specified length has been printed.
- In **Rewind** mode, the media and backing are rewound onto a core as the labels are printed.

Loading the Media

Figure 5 illustrates one method of media loading. For more detailed instructions, as well as information about how to load the different types of media and the various printing modes, refer to the instructions that begin on page 29.

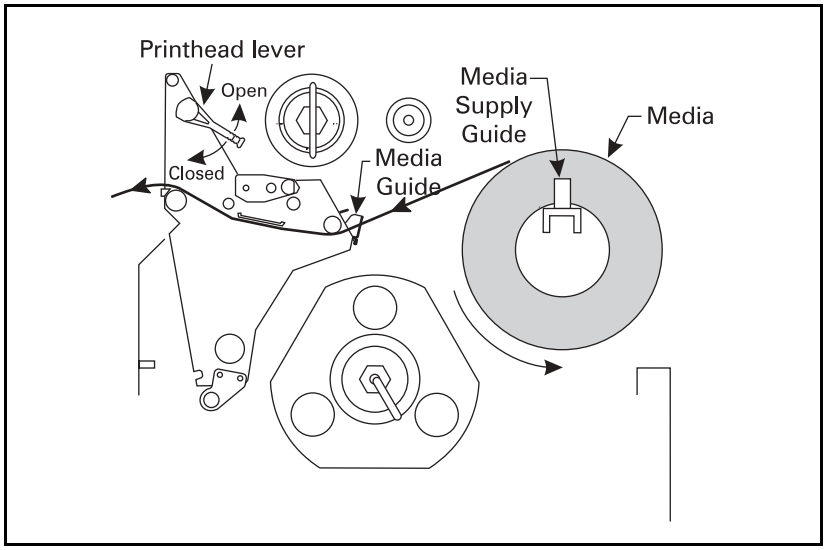


Figure 5

Positioning the Media Sensors

The correct positioning of the media sensors is important — it can make the difference between a perfect label and a call to Technical Support!

Transmissive Sensor

The web or gap sensor, also known as the “transmissive sensor,” detects the gap between labels.

The transmissive sensor actually consists of two sections: a light source (the lower media sensor) and a light sensor (the upper media sensor). The media passes between the two.

The upper media sensor must be positioned:

- Directly over the hole or notch, or
- Anywhere along the width of the media if there is a gap between labels.

NOTE: If you are using continuous media, position the upper media sensor over the media with the lower media sensor directly below it so that the printer can detect an out-of-paper condition.

Adjusting the Upper Media Sensor

Refer to Figure 6. (For clarity, not all printer parts are shown.)

1. Remove the ribbon (if it is installed). Refer to page 42 for details.
2. Locate the upper media sensor. The upper media sensor "eye" is directly below the adjustment screw head.
3. Slightly loosen the upper media sensor adjustment screw (use a Phillips-head screwdriver).
4. Using the tip of the screwdriver, slide the upper sensor along the slot to the desired position.
5. Tighten the upper media sensor adjustment screw.

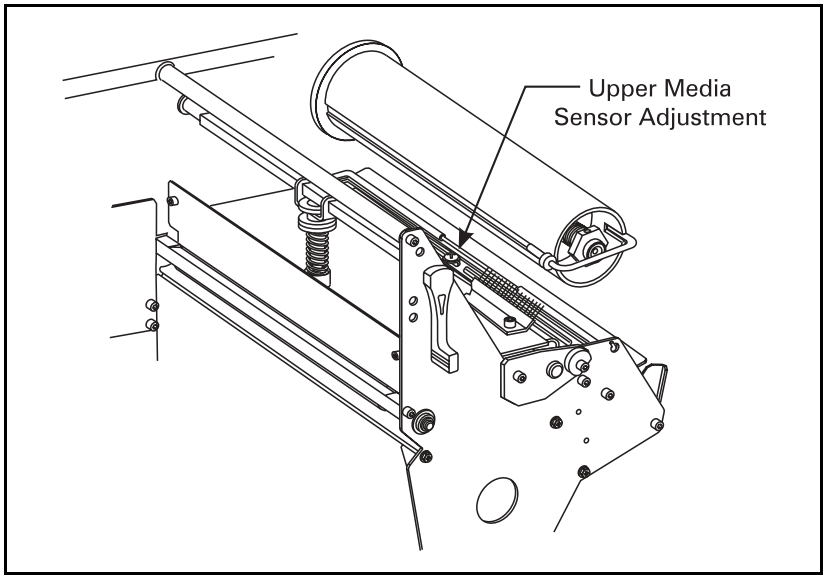


Figure 6

Adjusting the Lower Media Sensor

Position the lower media sensor (refer to Figure 7) by sliding it in its slot until the lower media sensor is positioned directly below the upper media sensor.

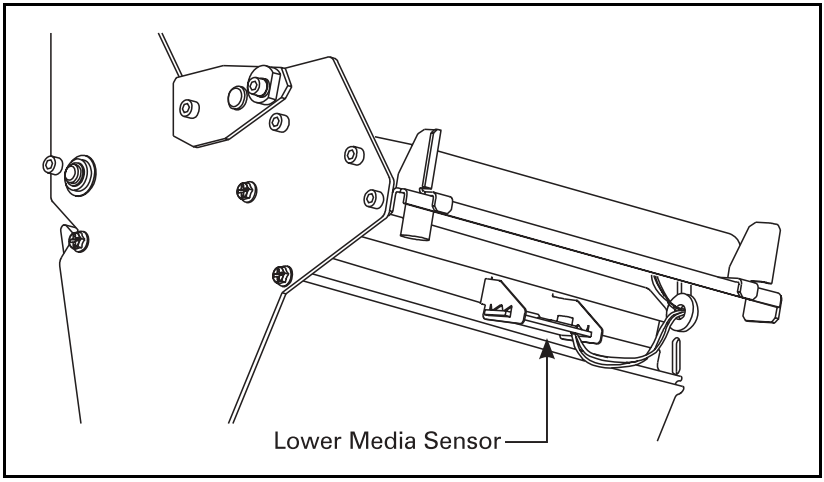


Figure 7

Black Mark Sensor

The optional black mark sensor is in a fixed position and enabled via the front panel (refer to “Configuring the Printer” on page 15 for details).

Loading the Ribbon

Figure 8 illustrates the ribbon path. For more detailed information, refer to the instructions that begin on page 40.

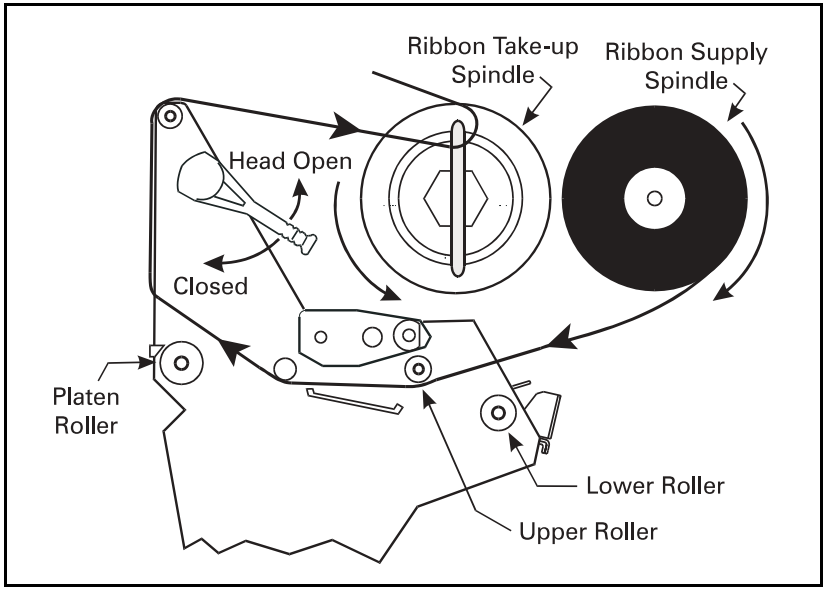


Figure 8

Operator Controls

POWER Switch

The POWER switch is located at the back of the printer above the power cord connector. Turn on the printer.

Front Panel

The step-by-step instructions in this section tell you which keys to press and what appears on the liquid crystal display (LCD) during the calibration procedure.

For a more detailed explanation of the front panel keys and lights (shown in Figure 9), refer to the instructions that begin on page 26.

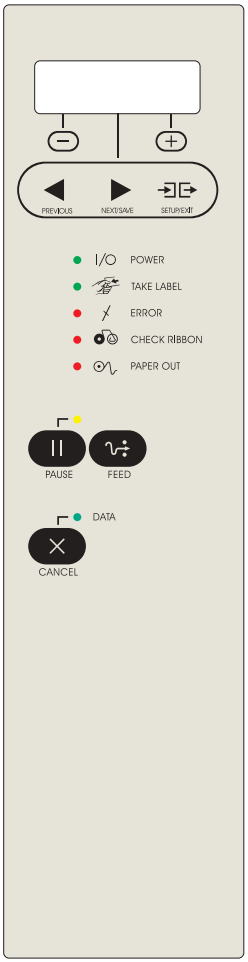


Figure 9

Configuring the Printer

The configuration procedure in the following table contains the information you need to get your printer up and running, *but it is not comprehensive*. Refer to page 43 for more information.

- Enter the configuration mode by pressing the SETUP/EXIT key at the "PRINTER READY" display.

NOTE: You need to press the NEXT/SAVE key more than once to advance to or skip some of the displays.

- To increase the value, answer "yes," indicate "on," or move to the next selection, use the (+) key.

- To decrease the value, answer "no," indicate "off," or return to the previous selection, use the (–) key.

NOTE: When changing parameters, an asterisk (*) in the upper left-hand corner of the display indicates that you have changed this setting from the setting that is currently stored in memory.

Press	Display Shows	Action/Explanation
—	PRINTER READY	Normal printer operation.
SETUP/EXIT	DARKNESS	Press the (+) or (–) keys to increase or decrease the print darkness setting. (You *may* need to change this setting when you print your label.)
NEXT/SAVE	PRINT MODE	Press the (+) or (–) keys to select tear-off, peel-off, cutter, or rewind mode.
NEXT/SAVE	MEDIA TYPE	Press the (+) or (–) keys to select continuous or non-continuous media type. (If you choose continuous media, you must also include a label length instruction in your label format.)
NEXT/SAVE	SENSOR TYPE	Press the (+) or (–) keys to select transmissive or black mark sensing mode. Unless your media has black marks on the back, leave your printer at the default setting (web).
NEXT/SAVE	PRINT METHOD	Press the (+) or (–) keys to select thermal transfer (if you are using ribbon) or direct thermal (no ribbon).
NEXT/SAVE	MAXIMUM LENGTH	Press the (+) or (–) keys to set the value that is closest to, but not less than, the length of the label you are using.
NEXT/SAVE	SAVE SETTINGS	Press the (+) or (–) keys to select: PERMANENT — saves changes when the power is turned off. Press NEXT/SAVE to accept the selection.
—	PRINTER READY	You have exited the configuration mode and are ready to calibrate the printer.

Configuring the Software or Printer Driver

Many printer settings may also be controlled by your printer's driver or label preparation software. Please refer to the driver or software documentation for more information.

Media and Ribbon Calibration

Initially, you may want to try autocalibrating the printer rather than proceeding with the full calibration procedure described below. To autocalibrate the printer:

1. Load the media and ribbon.
2. Close the printhead. The printer autocalibrates.

If the media fails to load or an error occurs, then perform the steps listed below.

NOTE: All steps *must* be performed in the following procedure, even if only one sensor needs to be adjusted.

1. Press the SETUP/EXIT key.
2. Press the NEXT/SAVE key until "MEDIA AND RIBBON CALIBRATE" displays.
3. Press the (+) key to start the calibration sequence. "LOAD BACKING CANCEL CONTINUE" displays.
4. Open the printhead. Remove approximately 8" (200 mm) of labels from the media roll, enough so that only the backing material is threaded between the media sensors when the media is loaded (refer to Figure 10).

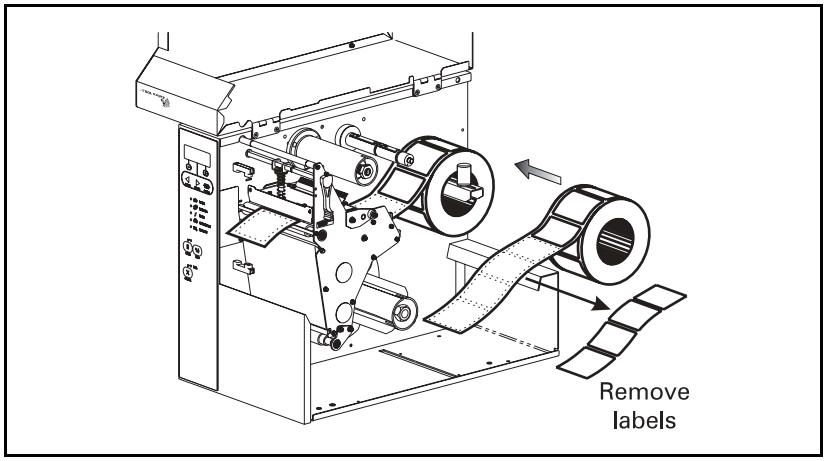


Figure 10

5. Press the (+) key. The front panel display shows “REMOVE RIBBON CANCEL CONTINUE.”
6. Slide the ribbon as far from the printer frame as possible.
7. Close the printhead, trapping the ribbon in this position.
8. Press the (+) key. The front panel shows “CALIBRATING PLEASE WAIT.”
9. When this part of the calibration process is completed, the display reads “RELOAD ALL CONTINUE.”
10. Open the printhead. Pull the backing material until a label is positioned between the media sensors.
11. Return the ribbon to its proper position.
12. Close the printhead. Press the (+) key to perform the next part of the calibration sequence. “MEDIA AND RIBBON CALIBRATE” displays. The printer is calibrated when the media stops feeding.
13. Press the SETUP/EXIT key to leave the programming mode. Choose “permanent” when SAVE CHANGES displays.
14. Press the NEXT/SAVE key to save the changes.

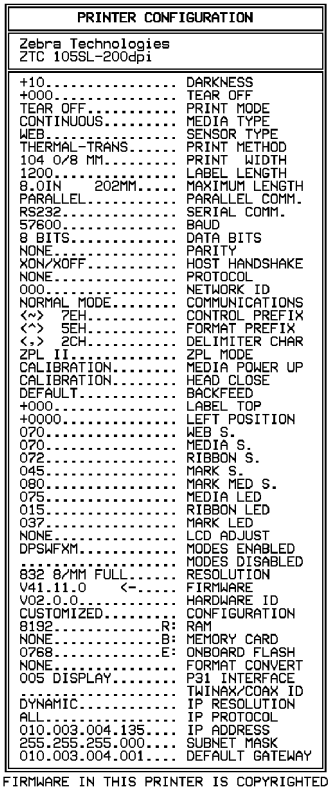
Printing a Test Label

To print a test label:

1. Turn off the printer.
2. Press and hold the CANCEL key while turning on the printer.

A configuration label prints showing the printer's currently stored parameters (similar to the one shown in Figure 11).

If you encounter any problems while you are configuring or calibrating the printer or printing a test label, refer to "Troubleshooting" beginning on page 79. Otherwise, refer to "Establishing Communication" beginning on page 21 to set up the communication parameters.


PRINTER CONFIGURATION

Zebra Technologies
ZTC 105SL-200dpi

+10..... DARKNESS
+000..... TEAR OFF
TEAR OFF..... PRINT MODE
CONTINUOUS..... MEDIA TYPE
WEB..... SENSOR TYPE
THERMAL-TRANS..... PRINT METHOD
104.0/8 MM..... PRINT WIDTH
1200..... LABEL LENGTH
8.0IN 202MM..... MAXIMUM LENGTH
PARALLEL..... PARALLEL COMM.
RS232..... SERIAL COMM.
57600..... BAUD
8 BITS..... DATA BITS
NONE..... PARITY
XON/XOFF..... HOST HANDSHAKE
NONE..... PROTOCOL
000..... NETWORK ID
NORMAL MODE..... COMMUNICATIONS
<~> 7EH..... CONTROL PREFIX
<^> 5EH..... FORMAT PREFIX
<,> 2CH..... DELIMITER CHAR
ZPL II..... ZPL MODE
CALIBRATION..... MEDIA POWER UP
CALIBRATION..... HEAD CLOSE
DEFAULT..... BACKFEED
+000..... LABEL TOP
+0000..... LEFT POSITION
070..... WEB S.
070..... MEDIA S.
072..... RIBBON S.
045..... MARK S.
080..... MARK MED S.
075..... MEDIA LED
015..... RIBBON LED
037..... MARK LED
NONE..... LCD ADJUST
DPSWFXM..... MODES ENABLED
..... MODES DISABLED
832 8/MM FULL..... RESOLUTION
V41.11.0 <-..... FIRMWARE
V02.0.0..... HARDWARE ID
CUSTOMIZED..... CONFIGURATION
8192.....R: RAM
NONE.....B: MEMORY CARD
0768.....E: ONBOARD FLASH
NONE..... FORMAT CONVERT
005 DISPLAY..... P31 INTERFACE
..... TWINAX/COAX ID
DYNAMIC..... IP RESOLUTION
ALL..... IP PROTOCOL
010.003.004.135.... IP ADDRESS
255.255.255.000.... SUBNET MASK
010.003.004.001.... DEFAULT GATEWAY

FIRMWARE IN THIS PRINTER IS COPYRIGHTED

Figure 11

Establishing Communication

System Considerations

NOTE: Depending on the date of manufacture, your Zebra 105*SL* printer may be equipped with either a DB25 serial connector or a DB9 serial connector.

Interfaces

The method of interfacing this printer to a data source depends on the communication options installed in the printer. Following are the standard interfaces for a DB25 and a DB9 serial interface connector:

Serial Connector	Standard Interfaces
DB25	• RS-232/RS-422/RS-485 serial data port • Bi-directional parallel port
DB9	• RS-232 serial data port • Bi-directional parallel port

The optional ZebraNet® PrintServer II enables printers to be connected to 10Base-T Ethernet networks. In addition, the IBM® Twinax or IBM Coax option is available for those applications that require them.

NOTE: If you have the DB9 serial interface connector, RS-422 and RS-485 serial data ports are available through an adapter. Contact your Zebra distributor for details.

Data Specifications

When communicating via an asynchronous serial data port (refer to Figure 12 for a DB25 serial interface connector and Figure 13 for a DB9 serial interface connector), the baud rate, number of data and stop bits, parity, and handshaking are user selectable. Parity only applies to data transmitted by the printer since the parity of received data is ignored.

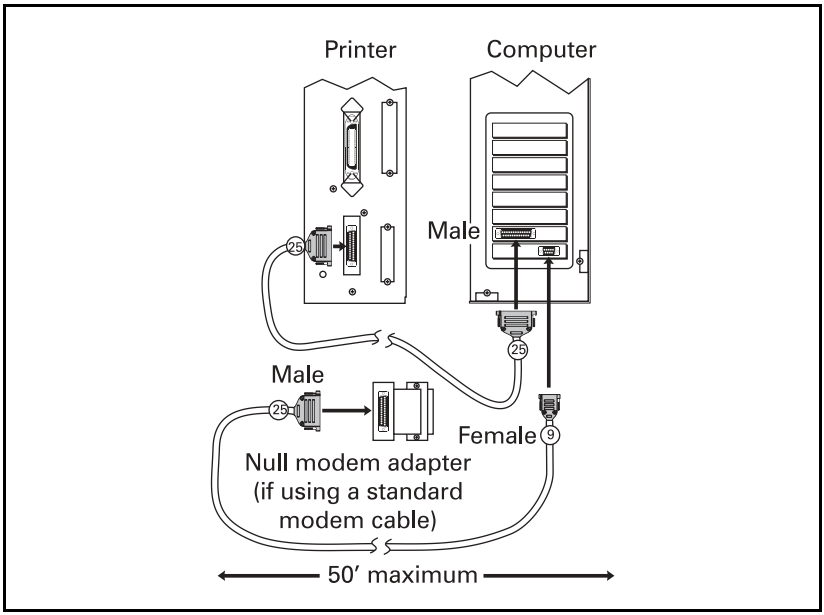


Figure 12

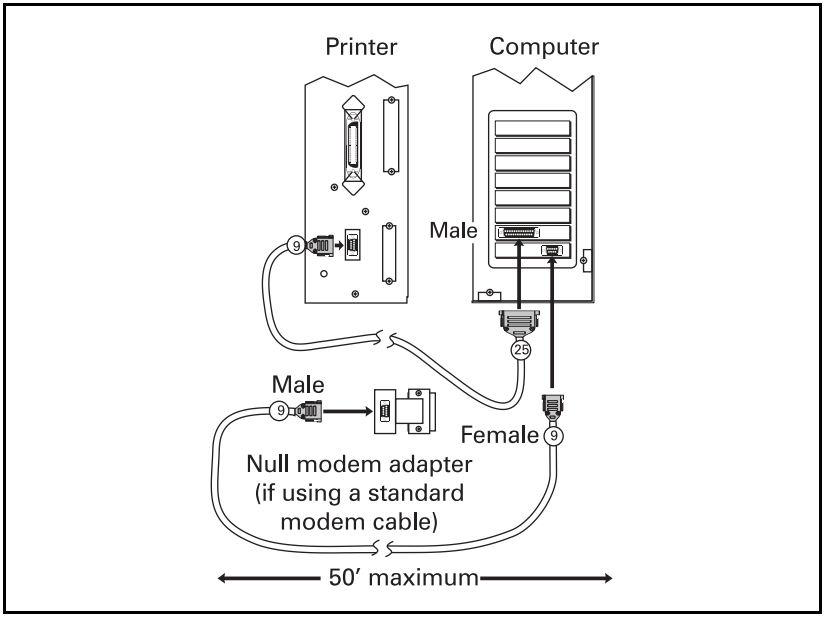


Figure 13

When communicating via the parallel port (refer to Figure 14), the previously mentioned parameters are not considered. Refer to page 54 to configure the communication parameters for the printer. The values selected must be the same as those used by the host equipment connected to the printer.

For serial and parallel pinout and technical information, refer to “Appendix A: DB25 Connectors” on page 99 or “Appendix B: DB9 Connectors” on page 105.

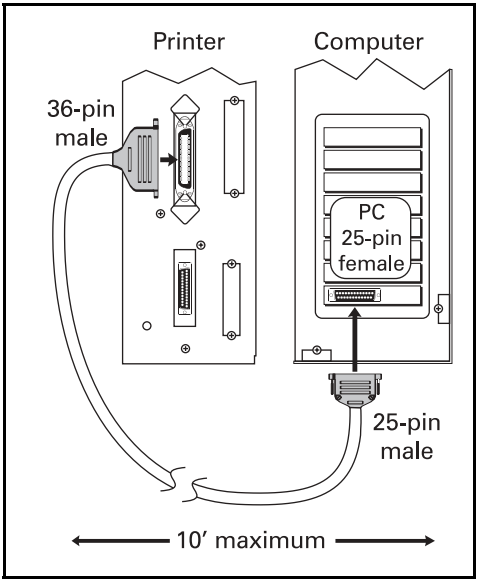


Figure 14

Cabling Requirements

Data cables must be fully shielded and fitted with metal or metalized connector shells. Shielded cables and connectors are required to prevent radiation and reception of electrical noise.

To minimize electrical noise pickup in the cable:

- Keep data cables as short as possible.
- Do not bundle the data cables tightly with the power cords.
- Do not tie the data cables to power wire conduits.

NOTE: Zebra printers comply with FCC “Rules and Regulations”, Part 15, Subpart J, for Class B Equipment, using fully shielded 6’ data cables. Use of longer cables or unshielded cables may increase radiated emissions above the Class B limits.

NOTE: RS-422 and RS-485 applications should use twisted shielded pairs as recommended in the Appendix of the TIA/EIA.-485 Specification.

Operator Controls

This section discusses the functions of the controls and indicators on the printer. Become familiar with each of these functions before operating your 105*SL* printer.

POWER Switch

This switch is located at the back of the printer above the power cord. The POWER switch should be turned off before connecting or disconnecting any cables.

External influences, such as lightning storms or noise on the power or data cables, may cause erratic printer behavior. Turning the printer's power off and back on may re-establish proper printer operation.

Front Panel Display

The front panel display (shown in Figure 15) communicates operational status and programming modes and parameters.

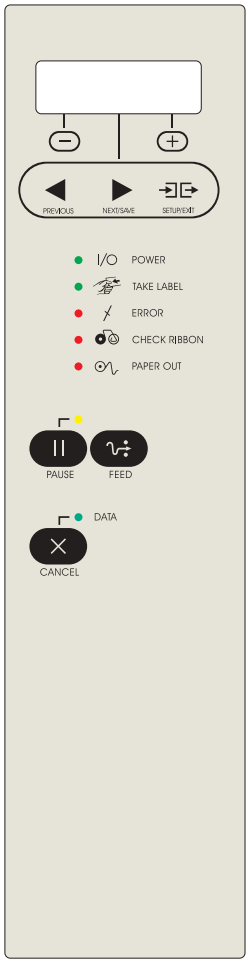


Figure 15

Front Panel Keys

Key	Function
	Starts and stops the printing process. • If the printer is not printing: no printing can occur. • If the printer is printing: printing stops once the current label is complete. Press to remove error messages from the display. **NOTE:** Pause mode can also be activated via ZPL II (`~PP`, `^PP`).
	Forces the printer to feed one blank label each time the key is pressed. • Printer not printing: one blank label immediately feeds. • Printing: one blank label feeds after the current batch of labels is complete. **NOTE:** Equivalent to the Slew to Home Position (`~PH`, `^PH`) ZPL II instruction.
	When in the pause mode, this key cancels print jobs. • Print job in queue: press once for each print job to be deleted. • Press and hold for several seconds to cancel all print jobs in the printer's memory. The DATA light turns off.
NOTE: The keys below are used only when configuring the printer. Specific uses of these keys are explained in "Configuration," beginning on page 43.	
	• Scrolls back to the previous parameter. • Press *and hold* to quickly go backward through parameter sets.
	• Scrolls forward to the next parameter. (Saves any changes you've made in the configuration and calibration sequence.) • Press *and hold* to quickly advance through parameter sets.
	Enters and exits the configuration mode.
	These keys change the parameter values. They are used in different ways depending on the parameter displayed. Common uses are: to increase/decrease a value; answer "yes" or "no;" indicate "on" or "off;" scroll through several choices; input the password; or set up the printer for a firmware download.

Front Panel Lights

NOTE: If two operating conditions occur simultaneously (for example, one that causes a light to be on constantly and one that causes the same light to flash), the light flashes.

Light	Status	Indication
POWER	Off	The printer is off or power is not applied.
	On	The printer is on.
TAKE LABEL	Off	Normal operation.
	Flashing	(Peel-off mode only.) The label is available. Printing is paused until the label is removed.
ERROR	Off	Normal operation — no printer errors.
	Flashing	A printer error exists. Check the display screen for more information.
CHECK RIBBON	Off	Normal operation — ribbon (if used) is properly loaded.
	On	Printing is paused, the front panel displays a warning message, and the PAUSE light is on. • If the printer is in direct thermal mode: Ribbon is loaded. • If the printer is in thermal transfer mode: No ribbon is loaded.
PAPER OUT	Off	Normal operation — media is properly loaded.
	On	No media is under the media sensor. Printing is paused, the display shows an error message, and the PAUSE light is on.
PAUSE	Off	Normal operation.
	On	The printer has stopped all printing operations. Either the PAUSE key was pressed, a pause command was included in the label format, the on-line verifier detected an error, or a printer error was detected. Refer to the display screen for more information.
DATA	Off	Normal operation. No data being received or processed.
	On	Data processing or printing is taking place. No data is being received.
	Flashing	The printer is receiving data from *or* sending status information to the host computer. Flashing slows when the printer cannot accept more data, but returns to normal once data is again being received.

Roll Media Loading

NOTE: A calibration must be performed with all loading modes during the following circumstances if the printer is set to feed or no motion at power up or head close:

- When media and ribbon (if used) are first installed in the printer.
- When media or ribbon is changed to a different type.

Tear-Off Mode

Refer to Figure 16.

1. Open the printhead.
2. Slide the media guide and media supply guide as far from the printer frame as possible.
3. Load media as shown.
4. Slide in the media guide and media supply guide so they just touch, but don't restrict, the edge of the roll.
5. Close the printhead.

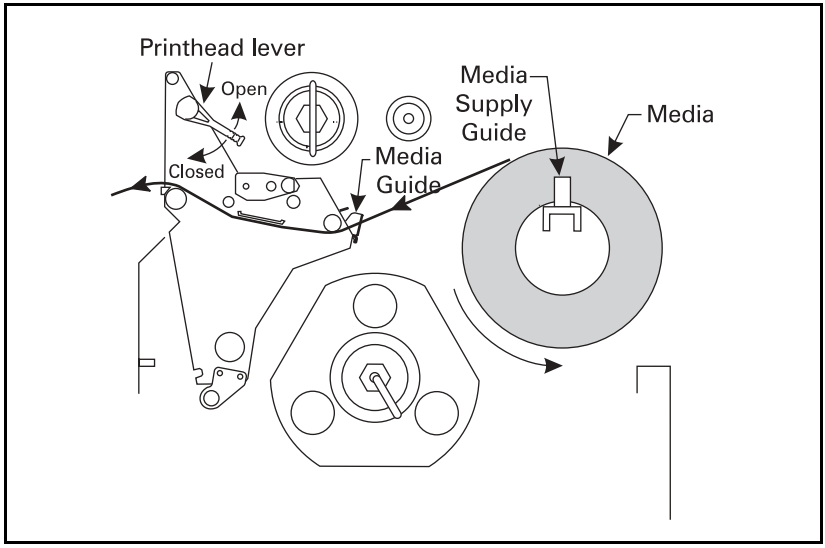


Figure 16

Peel-Off Mode

NOTE: The following instructions pertain to printers with the rewind option only.

Refer to Figure 17.

1. Remove the rewind plate from the front of the printer (if installed). Store it upside down on the two mounting screws on the inside of the front panel.
2. Open the printhead.
3. Slide the media guide and media supply guide as far from the printer frame as possible.
4. Load media as shown.
5. When loading media, allow approximately 36" (915 mm) of media to extend past the tear-off/peel-off bar. Remove all labels from this portion to create a leader.
6. Remove the hook from the rewind spindle. If you are using a core, slide it onto the rewind spindle until it is flush against the guide plate.
7. Wind the label backing around either the 3" (76.2 mm) core *or* the rewind spindle and reinstall the hook.
8. Slide in the media guide and media supply guide so they just touch, but don't restrict, the edge of the roll.

Before closing the printhead, make sure:

- The media is positioned against the inside guides.
- The media is taut and parallel with itself and the pathway when wound onto the rewind spindle/core.

9. Close the printhead.
10. To discard the label backing from the rewind spindle, refer to "Removing the Label Backing Material" on page 37.

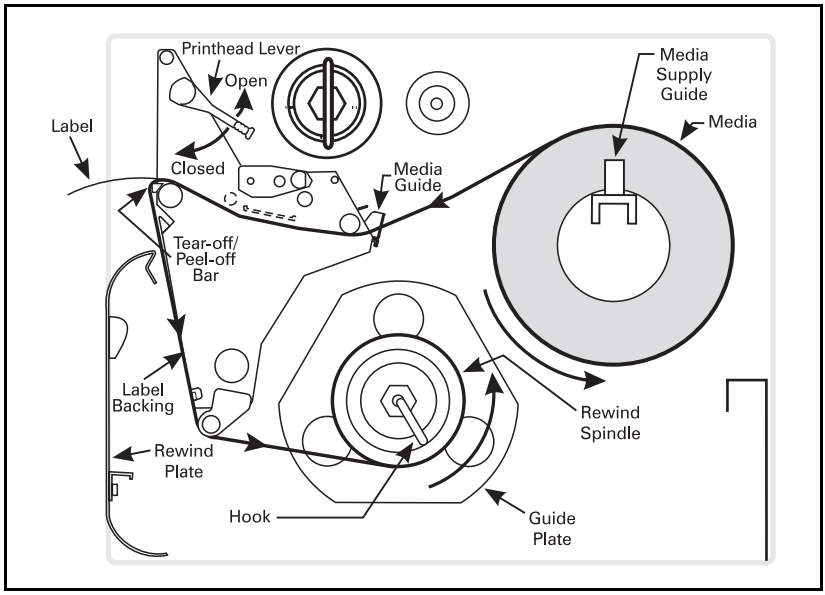

Printhead Lever
Open
Label
Closed
Media Guide
Media Supply Guide
Media
Tear-off/ Peel-off Bar
Label Backing
Rewind Plate
Hook
Guide Plate
Rewind Spindle

Figure 17

Rewind Mode

(Rewind option required)

Refer to Figure 18.

1. Remove the rewind plate from its storage location in front of the print mechanism inside the media compartment.
2. Invert the rewind plate so that the lip on the attached hook plate points down.
3. Insert the hook plate lip a short distance (½" or 13 mm) into the lower opening in the side plate.
4. Align the upper end of the rewind plate with the corresponding opening in the side plate. Slide in the rewind plate so that it stops against the printer's main frame.
5. Open the printhead.
6. Slide the media guide and media supply guide as far from the printer frame as possible.
7. Load media as shown.
8. When loading media, allow approximately 36" (915 mm) of media to extend past the printhead. Remove all labels from this portion to create a leader.
9. Remove the hook from the rewind spindle. If you are using a core, slide it onto the rewind spindle until it is flush against the guide plate.
10. Wind the label backing around either the 3" (76.2 mm) core *or* the rewind spindle and reinstall the hook.
11. Slide in the media guide and media supply guide so they just touch, but don't restrict, the edge of the roll.

Before closing the printhead, make sure:

- The media is positioned against the inside guides.
- The media is taut and parallel with itself and the pathway when wound onto the rewind spindle/core.

12. Close the printhead.

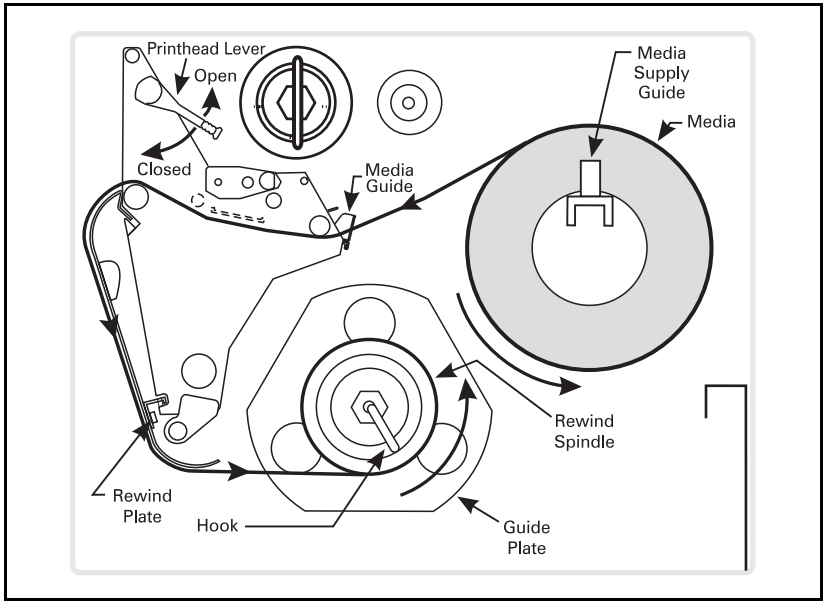


Figure 18

Cutter Mode

(Cutter option required)

Refer to Figure 19.

1. Open the printhead.
2. Slide the media guide and media supply guide as far from the printer frame as possible.
3. Load media as shown.
4. Slide in the media guide and media supply guide so they just touch, but don't restrict, the edge of the roll.
5. Close the printhead.
6. The printer automatically feeds out and cuts one label when the printer is turned on.

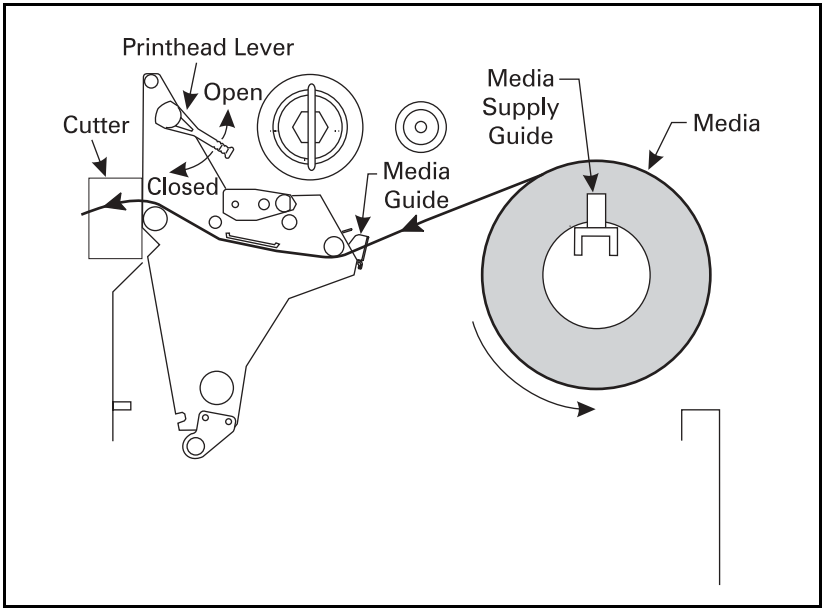


Figure 19

Peel-Only Mode

(Peel option required)

Refer to Figure 20.

1. Press the printhead open lever. The printhead assembly springs up.
2. Slide out the media supply guide as far from the printer frame as possible.
3. Place the roll of media on the media supply hanger and orient the media properly.
4. Slide in the media supply guide so that it just touches, but does not restrict, the edge of the roll.
5. Feed the media under the inner media guide in the print mechanism.
6. Pull approximately 36" (915 mm) of media through the front of the printer.
7. Ensure that the media is against the inner media guide. Slide in the outer media guide so that it just touches, but does not restrict, the edge of the media.
8. Close the printhead assembly.

NOTE: If your printer has a ***peel with a rewind*** option, remove the rewind plate and store it upside down on the mounting screw on the inside of the front panel before proceeding to step #9.

9. Remove the hook from the take-up spindle shaft.
10. Remove several labels from the media backing and then wind the backing 1-2 times around the media take-up spindle and reinstall the hook.

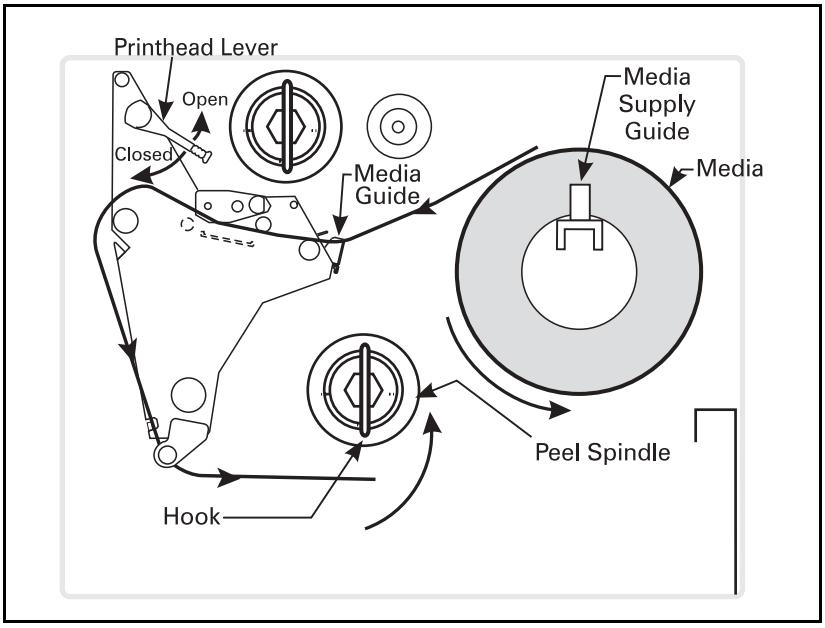

Printhead Lever
Open
Closed
Media Guide
Media Supply Guide
Media
Peel Spindle
Hook

Figure 20

Removing the Label Backing Material

NOTE: Since the rewind spindle holds the backing from a standard-size media roll, we recommend that you perform this procedure whenever you change the media.

To remove the backing material from the rewind spindle, follow these steps (you don't need to turn off the printer for this procedure):

1. Unwind approximately 36" (915 mm) of backing from the rewind spindle. Cut it off at the spindle.
2. Pull out the hook. Slide the backing material off of the rewind spindle and discard.
3. Wind the media around the rewind spindle once or twice and reinstall the hook. Continue winding to remove any slack in the media.

Fanfold Media Loading

NOTE: A calibration must be performed when media and ribbon (if used) are first installed in the printer, or when a different type of media or ribbon is being used.

Fanfold media feeds through either the bottom or rear access slot from outside the printer.

Refer to Figure 21 and Figure 22.

1. Open the printhead.
2. Slide the media guide as far from the printer frame as possible.
3. Load media as shown. If the printer is in cutter mode, route the media through the cutter.
4. Slide in the media guide so it just touches, but doesn't restrict, the edge of the roll.
5. Close the printhead.

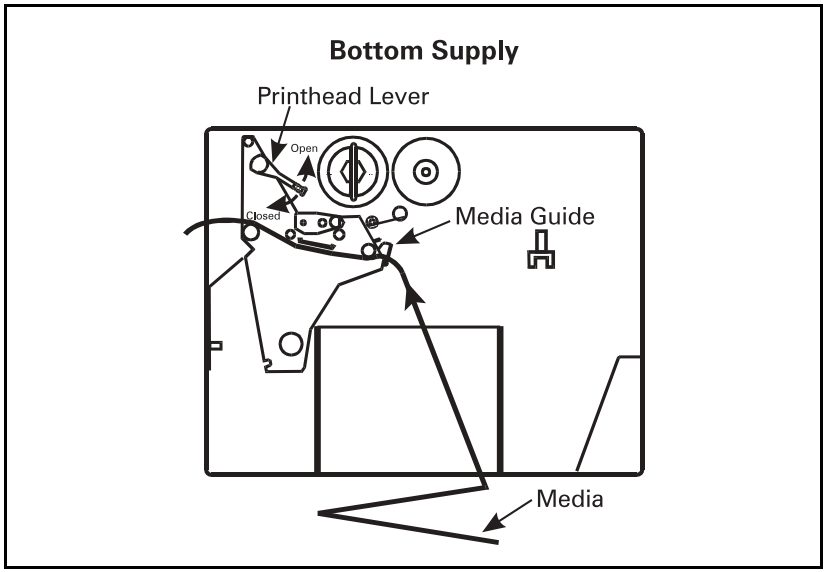


Figure 21

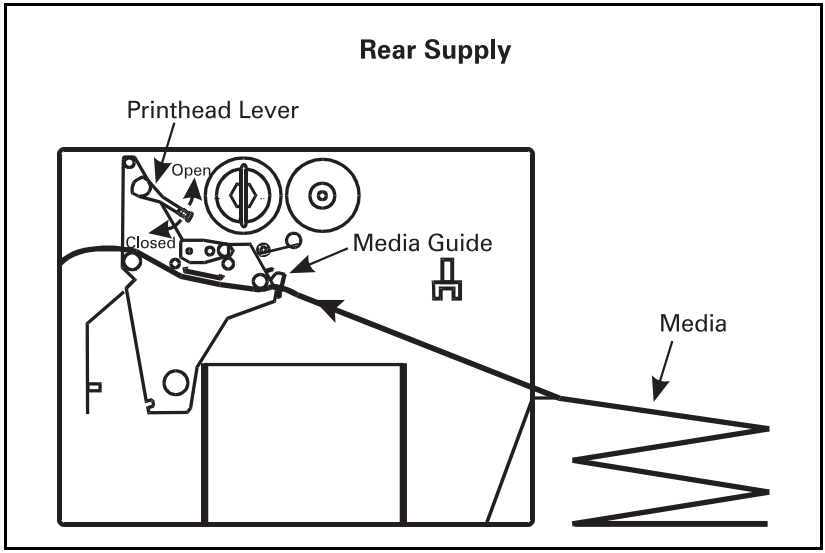


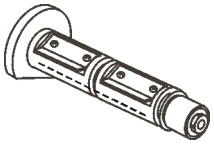
Figure 22

Ribbon Loading

To load ribbon, refer to Figure 23 and follow the procedure below.

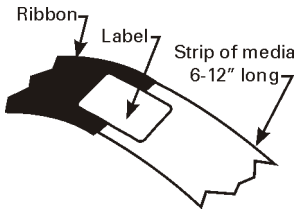
NOTE: Always use ribbon that is at least as wide as the media. The smooth backing of the ribbon protects the printhead from wear and premature failure due to excessive abrasion. (*For direct thermal print mode, ribbon is not used and should not be loaded in the printer.*)

1. Align the segments of the ribbon supply spindle.
2. Place the ribbon roll on the ribbon supply spindle.



NOTE: Make sure that the core is pushed up against the stop on the ribbon supply spindle and that the ribbon is aligned squarely with its core. If this is not done, the ribbon may not cover the printhead entirely on the inside, exposing print elements to potentially damaging contact with the media.

3. To make ribbon loading and unloading easier, make a leader for your ribbon roll if one is not present.
4. Tear off a strip of media (labels and backing) about 6-12" (150-305 mm) long from the roll. Peel off a label from this strip. Apply half of this label to the end of the strip and the other half to the end of the ribbon. This acts as a ribbon leader.



5. Open the printhead and thread the leader and attached ribbon through the print mechanism, under the upper roller, and past the platen roller as shown.
6. Before wrapping the ribbon around the ribbon take-up spindle, ensure the ribbon hook is placed correctly. The ribbon hook fits snugly in the notch (see Figure 24).
7. Place the ribbon (with leader) around the ribbon take-up spindle and wind counterclockwise for several turns (see Figure 23).
8. Close the printhead.

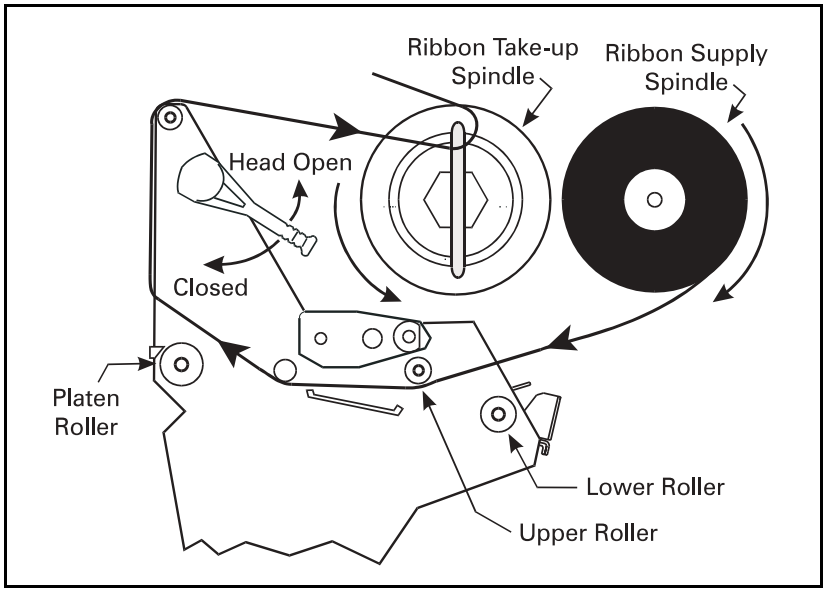


Figure 23

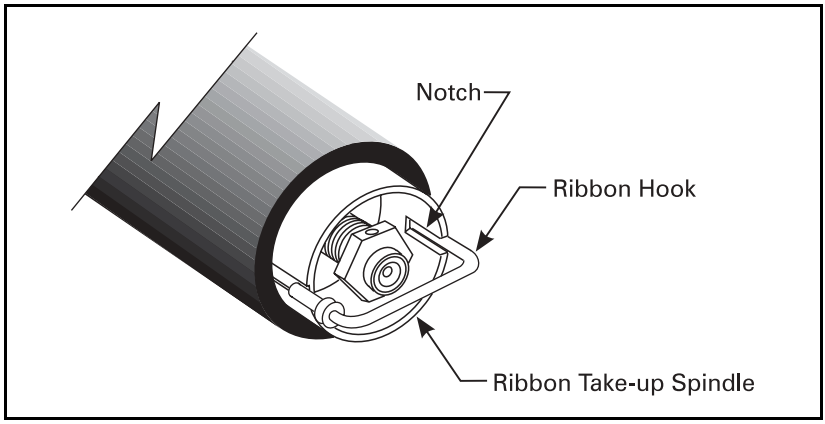


Figure 24

Ribbon Removal

Refer to Figure 25.

1. If the ribbon is not exhausted, cut or break it as close to the ribbon take-up spindle as possible.
2. Push the hook either forward or backward with your thumb until it slips out of the groove (1). Slide the hook to the side (2), then rotate it back and forth several times to loosen it (3).
3. Remove the loosened hook from the spindle (4).
4. Lightly tap the top of the used ribbon to loosen it; grasp the used ribbon and remove it from the ribbon take-up spindle.
5. Remove the core from the ribbon supply spindle.
6. Follow the ribbon loading procedure on page 40 to load the new ribbon.

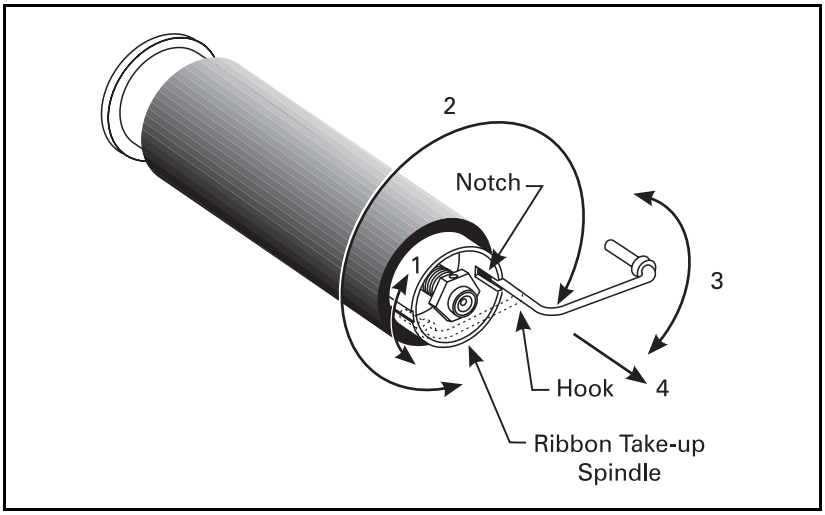


Figure 25

After you have installed the media and ribbon and the power-on self test (POST) is complete, the front panel display shows "PRINTER READY." (If the printer fails its POST, refer to page 85.) Using the front panel display and the five keys directly below it, set the printer parameters for your application.

NOTE: Printers that are operating on an IP network can be quickly configured using ZebraLink™ WebView (optional ZebraNet® PrintServer II required). For information, refer to *ZebraNet Networking: PrintServer II Installation and User's Guide*.

If it becomes necessary to restore the initial printer defaults, see "FEED Key and PAUSE Key Self Test" on page 89.

NOTE: Unless otherwise noted, all parameters are listed in the order they are displayed, starting with "DARKNESS."

Entering the Setup Mode

To enter the programming mode, press the SETUP/EXIT key. Press either the NEXT/SAVE key or PREVIOUS key to scroll to the parameter you wish to set.

NOTE: You may also press *and hold* the NEXT/SAVE and PREVIOUS keys to advance quickly through the configuration parameters.

Parameters in this section are shown in the order displayed when pressing the NEXT/SAVE key. Throughout this process, press the NEXT/SAVE key to continue to the next parameter, or press the PREVIOUS key to return to the previous parameter in the cycle.

An asterisk (*) in the upper left-hand corner of the display indicates that the value displayed is different than the currently stored value.

Changing Password-Protected Parameters

Certain parameters are password-protected by factory default.

CAUTION: Do not change password-protected parameters unless you are sure you know what you are doing! If the parameters are set incorrectly, they could cause the printer to function in an unpredictable way.

The first attempt to change one of these parameters (pressing either the (+) or (–) key) requires you to enter a four-digit password at the "ENTER PASSWORD" display. The (–) key changes the selected digit position; the (+) key increases the selected digit value. After entering the password, press the NEXT/SAVE key. The parameter you wish to change is displayed. If the password was entered correctly, you can now change the value.

The default password value is 1234. The password can be changed using the ^KP (Define Password) ZPL II instruction or through ZebraLink™ WebView (optional ZebraNet® PrintServer II required).

NOTE: Once the password has been entered correctly, it does not have to be entered again unless you leave and re-enter the programming mode using the SETUP/EXIT key.

NOTE: You can disable the password protection feature so that it no longer prompts you for a password by setting the password to ØØØØ via the ^KPØ ZPL/ZPL II command. To re-enable the password-protection feature, send the ZPL/ZPL II command ^KPx, where "x" can be any number, one to four digits in length, except Ø.

Leaving the Setup Mode

You can leave the program mode at any time by pressing the SETUP/EXIT key. The "SAVE CHANGES" display appears. There are five choices, as described below. Pressing the (–) or (+) key displays other choices and pressing the NEXT/SAVE key selects the displayed choice.

- PERMANENT — Permanently saves the changes. Values are stored in the printer even when power is turned off.
- TEMPORARY — Saves the changes until you change them again or until power is turned off.
- CANCEL — Cancels all changes from the time you pressed the SETUP/EXIT key except the darkness and tear-off settings (if they were changed).
- LOAD DEFAULTS — Loads factory defaults. The factory defaults are shown on the following pages.

NOTE: Loading factory defaults requires printer calibration.

- LOAD LAST SAVE — Loads values from the last permanent save.

Configuration and Calibration Sequence

Press	Display Shows	Action/Explanation
—	PRINTER READY	Normal printer operation.
Setting Print Parameters		
SETUP/EXIT	DARKNESS	**Adjusting Print Darkness:** Press the (+) key to increase darkness. Press the (–) key to decrease darkness. **Default:** +10 **Range:** 0 to +30 Darkness settings are dependent upon a variety of factors including ribbon type, media, and the condition of the printhead. You may adjust the darkness for consistent high-quality printing. If printing is too light, or if there are voids in printed areas, increase the darkness. If printing is too dark, or if there is spreading or bleeding of printed areas, decrease the darkness. The FEED Key Self Test on page 88 can also be used to determine the best darkness setting. Since the darkness setting takes effect immediately, you can see the results on labels that are currently printing. **CAUTION:** Set the darkness to the lowest setting that provides good print quality. Darkness set too high may cause ink smearing and/or it may burn through the ribbon. Darkness settings also may be changed by the driver or software settings.
NEXT/SAVE	TEAR OFF	**Adjusting the Tear-Off Position:** Press the (+) key to increase the value, press the (–) key to decrease the value. Each press of the key adjusts the tear-off position by four dot rows. **Default:** +0 **Range:** –120 to +120 This parameter establishes the position of the media over the tear-off/peel-off bar after printing. The label and backing can be torn off or cut between labels.
NEXT/SAVE	PRINT MODE	**Selecting Print Mode:** Press the (+) or (–) key to display other choices. **Default:** Tear-off **Selections:** Tear-off, peel-off, cutter, rewind Print mode settings tell the printer the method of media delivery that you wish to use. Select a print mode that your hardware configuration supports since some selections displayed are for optional printer features.

Press	Display Shows	Action/Explanation
NEXT/SAVE	MEDIA TYPE	**Setting Media Type:** Press the (+) or (–) key to display other choices. **Default:** Non-Continuous **Selections:** Continuous, non-continuous This parameter tells the printer the type of media you are using. Selecting continuous media requires that you include a label length instruction in your label format (**^LLxxxx** if you are using ZPL or ZPL II). When non-continuous media is selected, the printer feeds media to calculate label length (the distance between two detections of the inter-label gap, webbing, or alignment notch or hole).
NEXT/SAVE	SENSOR TYPE	**Setting the Sensor Type:** Press the (+) or (–) key to display other choices. **Default:** Web **Selections:** Web, mark This parameter tells the printer whether you are using media with a web (gap/space between labels, notch, or hole) to indicate the separations between labels or if you are using media with a black mark printed on the back. If your media does not have black marks on the back, leave your printer at the default (web).
NEXT/SAVE	PRINT METHOD	**Selecting Print Method:** Press the (+) key for the next value; press the (–) key for the previous value. **Default:** Thermal transfer **Selections:** Thermal transfer, direct thermal The print method parameter tells the printer the method of printing you wish to use: direct thermal (no ribbon) or thermal transfer (using thermal transfer media and ribbon). **NOTE:** Selecting direct thermal when using thermal transfer media and ribbon creates a warning condition, but printing continues.

Press	Display Shows	Action/Explanation
NEXT/SAVE	PRINT WIDTH	**Setting Print Width:** Press the (+) key to increase the value, press the (–) key to toggle to a different digit. To change the unit of measurement, press the (–) key until the unit of measurement is active, then press the (+) key to toggle to a different unit of measure (inches, mm, or dots). **Default; Range:** The default and range of acceptable values vary depending on what printer you have. Refer to "Printing Specifications" on page 94 for further information about the ranges available for your model. Print width determines the printable area across the width of the label.
NEXT/SAVE	MAXIMUM LENGTH	**Setting Maximum Length:** Press the (–) key to decrease the value, press the (+) key to increase the value. **Default; Range:** The default and range of acceptable values vary depending on your printer's configuration. Values are adjustable in 1" (25.4 mm) increments. Maximum length is used in conjunction with the calibration procedure. The value of this setting determines the maximum label length used during the media portion of the calibration process. Only a few labels are required to set media sensors. Always set the value that is closest to, but not lower than, the length of the label you are using. For example, if the length of the label is 14.5 inches (368 mm), set the parameter for 15.0 inches (381 mm).

Listing Printer Information		
Press	**Display Shows**	**Action/Explanation**
NEXT/SAVE	LIST FONTS	**List Fonts:** Press the (+) key to print a label listing all of the available fonts. This selection is used to print a label that lists all of the fonts currently available in the printer, including standard printer fonts plus any optional fonts. Fonts may be stored in RAM, FLASH memory, font EPROMs, or font cards.
NEXT/SAVE	LIST BAR CODES	**List Bar Codes:** Press the (+) key to print a label listing all of the available bar codes. This selection is used to print a label that lists all of the bar codes currently available in the printer.
NEXT/SAVE	LIST IMAGES	**List Images:** Press the (+) key to print a label listing all of the available images. This selection is used to print a label that lists all of the images currently stored in the printer's RAM, FLASH memory, optional EPROM, or optional memory card.
NEXT/SAVE	LIST FORMATS	**List Formats:** Press the (+) key to print a label listing all of the available formats. This selection is used to print a label that lists all of the formats currently stored in the printer's RAM, FLASH memory, optional EPROM, or optional memory card.
NEXT/SAVE	LIST SETUP	**List Setup:** Press the (+) key to print a label listing the current printer configuration. This selection is used to print a label that lists the current printer configuration information. (Same as CANCEL Key Self Test.)
NEXT/SAVE	LIST ALL	**List All:** Press the (+) key to print a label listing all of the available fonts, bar codes, images, formats, and the current printer configuration. This selection is used to print a label that lists the five previous selections, as described.

Press	Display Shows	Action/Explanation
NEXT/SAVE	INITIALIZE CARD	**Initialize Memory Card** **CAUTION:** Perform this operation only when it is necessary to erase all previously stored information from the optional memory card (for printers with a PCMCIA slot). Press the NEXT/SAVE key to bypass this function. 1. Press the (+) key to select "**YES.**" If your printer is set to require a password, you are prompted to enter the password. Enter the password and then press the NEXT/SAVE key. 2. The display asks "INITIALIZE CARD?". Press the (+) key to select "**YES.**" 3. The front panel LCD asks "ARE YOU SURE?". 4. Press the (+) key "**YES**" to begin initialization. ***or*** Press the (–) key "**NO**" to cancel the request and return to the "INITIALIZE CARD" prompt. 5. Press the SETUP/EXIT key followed by the NEXT/SAVE key. If initialization is still in process, the front panel display flashes back and forth between the two phrases "CHECKING B: MEMORY" and "PRINTER IDLE." When initialization is complete, the printer automatically exits the configuration mode and the front panel displays "PRINTER READY." **NOTE:** Depending on the amount of memory in the memory card, initialization may take up to five minutes to complete.

 NEXT/SAVE	INIT FLASH MEM	**Initialize Flash Memory** **CAUTION:** Perform this operation only when it is necessary to erase all previously stored information from the FLASH memory. Press the NEXT/SAVE key to bypass this function. 1. Press the (+) key to select "**YES.**" If your printer is set to require a password, you are prompted to enter the password. Enter the password and then press the NEXT/SAVE key. 2. The display asks "INITIALIZE FLASH?". Press the (+) key to select "**YES.**" 3. The front panel LCD asks "ARE YOU SURE?". 4. Press the (+) key "**YES**" to begin initialization. *or* Press the (–) key "**NO**" to cancel the request and return to the "INITIALIZE FLASH" prompt. 5. Press the SETUP/EXIT key followed by the NEXT/SAVE key. If initialization is still in process, the front panel display flashes back and forth between the two phrases "CHECKING E: MEMORY" and "PRINTER IDLE." When initialization is complete, the printer automatically exits the configuration mode and the front panel displays "PRINTER READY." **NOTE:** Depending on the amount of free FLASH memory, initialization may take up to one minute to complete.

Media and Ribbon Sensor Calibration

NOTE: Before you begin this procedure, make sure that the maximum length is set to a value equal to or greater than the length of the labels you are using. If the maximum length is set to a lower value, the calibration process assumes that continuous media is in the printer. See page 48 for more information.
There are two different types of calibration that can be performed by the printer:
1) Auto Calibration. When the printer is first powered up and after the print head has been closed, the printer feeds media and automatically sets the value it detects for media, media backing material (the spaces between labels), and media out. This type of calibration also occurs as part of the sensor profile and media and ribbon calibration procedures.
2) Media and Ribbon Sensor Sensitivity Calibration. Performing the media and ribbon calibration procedure first resets the sensitivity of the sensors to better detect the media and ribbon you are using. With the sensors at their new sensitivity, the printer then performs the auto calibration described above. Changing the type of ribbon and/or media may require resetting the sensitivity of the media and ribbon sensors. Indications that the sensitivity may need to be reset would be a CHECK RIBBON light on with the ribbon properly installed or non-continuous media being treated as continuous media.

Press	Display Shows	Action/Explanation
▶ NEXT/SAVE	SENSOR PROFILE	**Sensor Profile:** Press NEXT/SAVE to skip this standard calibration procedure and continue with the media and ribbon calibration parameter which follows. Press the (+) key to initiate this standard calibration procedure and print a media sensor profile. See Figure 26. The media sensor profile may be used to troubleshoot registration problems that may be caused when the media sensor detects preprinted areas on the media or experiences difficulty in determining web location. If the sensitivity of the media and/or ribbon sensors MUST be adjusted, use the media and ribbon sensor sensitivity procedure.

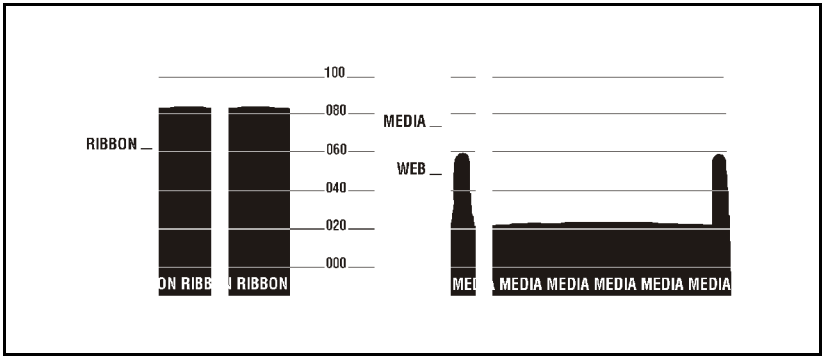


Figure 26

Press	Display Shows	Action/Explanation
NEXT/SAVE	MEDIA AND RIBBON CALIBRATE	**Media and Ribbon Sensor Sensitivity:** Press NEXT/SAVE to skip the calibration procedure and continue with the host port selection parameters that follow. Press the (+) key to start the calibration procedure. This procedure is used to adjust the sensitivity of the media and ribbon sensors. **NOTE:** The procedure must be followed exactly as presented. All steps must be performed even if only one of the sensors requires adjustment.
Media and Ribbon Calibration Procedure		
	LOAD BACKING	1) Open the printhead. 2) Remove approximately 8" (200 mm) of labels from the media roll, enough so that only the backing material is threaded between the media sensors when the media is loaded. 3) Close the printhead. **NOTE:** If you want to cancel the operation, press the (–) key.
	REMOVE RIBBON	1) Open the printhead. 2) Remove the ribbon (sliding it as far to the right as possible has the same effect as removing it). 3) Close the printhead. **NOTE:** If you want to cancel the operation, press the (–) key.
	CALIBRATING PLEASE WAIT	The printer automatically adjusts the scale (gain) of the signals it receives from the media and ribbon sensors based on the specific media and ribbon combination you are using. On the sensor profile, this essentially corresponds to moving the graph up or down to optimize the readings for your application.
—	RELOAD ALL	When “RELOAD ALL” is displayed: 1) Open the printhead and pull the media forward until a label is positioned under the media sensor. 2) Move the ribbon back to its proper position. 3) Close the printhead.
	MEDIA AND RIBBON CALIBRATE	Now that the scale has changed, the printer performs another calibration. During this process, the printer checks the readings for the media and ribbon based on the new scale you have established, determines the label length, and determines whether you are in direct thermal or thermal transfer print mode. The process is now complete! To see the new readings on the new scale, print a sensor profile.

Setting Communication Parameters

Communication parameters must be set correctly for the printer to communicate with the host computer. These parameters make sure that the printer and host computer are "speaking the same language." All communications parameters are password protected.

Press	Display Shows	Action/Explanation
NEXT/SAVE	SERIAL COMM	**Setting Serial Communications:** Press the (+) or (–) key to display other choices. **Default:** RS-232 **Selections:** RS-232, RS-422/485, RS-485 multidrop Select the communications port that matches the one being used by the host computer.
NEXT/SAVE	PARALLEL COMM	**Setting Parallel Communications:** Press the (+) or (–) key to display other choices. **Default:** Parallel **Selections:** Parallel, twinax/coax Select the communications port that matches the one being used by the host computer.
NEXT/SAVE	BAUD	**Setting Baud:** Press the (+) or (–) key to display other choices. **Default:** 9600 **Selections:** 110, 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200 The baud setting of the printer must match the baud setting of the host computer for accurate communications to take place. Select the value that matches the one being used by the host computer.
NEXT/SAVE	DATA BITS	**Setting Data Bits:** Press the (+) or (–) key to display other choices. **Default:** 7-bits **Selections:** 7-bits, 8-bits The data bits of the printer must match the data bits of the host computer for accurate communications to take place. Set the data bits to match the setting being used by the host computer. **NOTE:** Must be set to 8 data bits to use Code Page 850.

Press	Display Shows	Action/Explanation
NEXT/SAVE	PARITY	**Setting Parity:** Press the (+) or (–) key to display other choices. **Default:** Even **Selections:** Even, odd, none The parity of the printer must match the parity of the host computer for accurate communications to take place. Select the parity that matches the one being used by the host computer.
NEXT/SAVE	STOP BITS	**NOTE:** Depending on the model you have, this menu item may not be available. **Setting Stop Bits:** Press the (+) or (–) key to display other choices. **Default:** 1 stop bit **Selections:** 1 stop bit, 2 stop bits The stop bits of the printer must match the stop bits of the host computer for accurate communications to take place. Select the stop bits that match the one being used by the host computer.
NEXT/SAVE	HOST HANDSHAKE	**Setting Host Handshake:** Press the (+) or (–) key to display other choices. **Default:** XON/XOFF **Selections:** XON/XOFF, DTR/DSR, RTS/CTS The handshake protocol of the printer must match the handshake protocol of the host computer for communications to take place. Select the handshake protocol that matches the one being used by the host computer.
NEXT/SAVE	PROTOCOL	**Setting Protocol:** Press the (+) or (–) key to display other choices. **Default:** None **Selections:** None, Zebra, ACK/NACK Protocol is a type of error checking system. Depending on the selection, an indicator may be sent from the printer to the host computer signifying that data has been received. Select the protocol that is requested by the host computer. Further details on protocol can be found in the *ZPL II Programming Guide Volume I*. **NOTE:** Zebra is the same as ACK/NACK except that with Zebra the response messages are in packets. **NOTE:** If Zebra is selected, printer must use either “DTR/DSR” or “RTS/CTS” host handshake protocol. **NOTE:** Protocol error works in serial mode only.

Press	Display Shows	Action/Explanation
NEXT/SAVE	NETWORK ID	**Setting Network ID:** Press the (–) key to move to the next digit position, press the (+) key to increase the value of the digit. **Default:** 000 **Range:** 000 - 999 Network ID is used to assign a unique number to a printer used in an RS-422/RS-485 network. This gives the host computer the means to address a specific printer. If the printer is used in a network, you must select a network ID number. This does not affect TCP/IP or IPX networks.
NEXT/SAVE	COMMUNICATIONS	**Setting Communications Mode:** Press the (+) or (–) key to display other choices. **Default:** Normal mode **Selections:** Normal mode, diagnostics The communication diagnostics mode is a troubleshooting tool for checking the interconnection between the printer and the host computer. When “diagnostics” is selected, all data sent from the host computer to the printer is printed as straight ASCII hex characters. The printer prints all characters received including control codes, like CR (carriage return). A sample printout is shown in Figure 35 on page 89. **NOTES** on diagnostic printouts: • FE indicates a framing error. • OE indicates an overrun error. • PE indicates a parity error. • NE indicates noise. For any errors, check that your communication parameters are correct. Set the print width equal to or less than the label width used for the test. See page 48 for more information.

Selecting Prefix and Delimiter Characters

Prefix and delimiter characters are 2-digit hex values used within the ZPL/ZPL II formats sent to the printer. The printer uses the last prefix and delimiter characters sent to it, whether from a ZPL II instruction or from the front panel.

NOTE: DO NOT use the same hex value for the control, format, and delimiter character. The printer needs to see different characters to function properly.

Press	Display Shows	Action/Explanation
NEXT/SAVE	CONTROL PREFIX	**Control Prefix Character:** Press the (–) key to move to the next digit position, press the (+) key to increase the value of the digit. **Default:** 7E (tilde — displayed as a black square) **Range:** 00-FF The printer looks for this 2-digit hex character to indicate the start of a ZPL/ZPL II control instruction.
NEXT/SAVE	FORMAT PREFIX	**Format Prefix Character:** Press the (–) key to move to the next digit position, press the (+) key to increase the value of the digit. **Default:** 5E (caret) **Range:** 00 - FF The printer looks for this 2-digit hex character to indicate the start of a ZPL/ZPL II format instruction.
NEXT/SAVE	DELIMITER CHAR	**Delimiter Character:** Press the (–) key to move to the next digit position, press the (+) key to increase the value of the digit. **Default:** 2C (comma) **Range:** 00 - FF The delimiter character is a 2-digit hex value used as a parameter place marker in ZPL/ZPL II format instructions. Refer to the *ZPL II Programming Guide Volume I* for more information.

Selecting ZPL Mode		
Press	**Display Shows**	**Action/Explanation**
 NEXT/SAVE	ZPL MODE	**Selecting ZPL Mode:** Press the (+) or (–) key to display other choices. **Default:** ZPL II **Selections:** ZPL II, ZPL The printer remains in the selected mode until it is changed by this front panel instruction or by using a ZPL/ZPL II command. The printer accepts label formats written in either ZPL or ZPL II. This eliminates the need to rewrite any ZPL formats you already have. Refer to the *ZPL II Programming Guide Volume II* for more information on the differences between ZPL and ZPL II.
Power-Up and Head Close Parameters		
 NEXT/SAVE	MEDIA POWER UP	**Media Power-Up:** Press the (+) or (–) key to display other choices. **Default:** Calibration **Selections:** Feed, calibration, length, and no motion This parameter establishes the action of the media when the printer is turned on. • Calibration: Recalibrates the media sensors. • Feed: Feeds the label to the first web. • Length: Determines the length of the label. • No Motion: Media does not move.
 NEXT/SAVE	HEAD CLOSE	**Head Close:** Press the (+) or (–) key to display other choices. **Default:** Calibration **Selections:** Feed, calibration, length, no motion Determines the action of the media after the printhead has been opened and then closed. • Calibration: Recalibrates the media sensors. • Feed: Feeds the label to the first web. • Length: Determines the length of the label. • No Motion: Media does not move.

Label Positioning Parameters		
Press	**Display Shows**	**Action/Explanation**
 NEXT/SAVE	BACKFEED	**Backfeed Sequence:** Press the (+) or (–) key to display other choices. **Default:** Default (90%) **Selections:** Default, after, before, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, off This parameter establishes when and how much label backfeed occurs after a label is removed or cut in the peel-off, cutter, and applicator modes. It has no effect in rewind or tear-off modes. This parameter setting can be superseded by the ~JS instruction when received as part of a label format (refer to the *ZPL II Programming Guide Volume I*). **NOTE:** The difference between the value entered and 100% establishes how much backfeed occurs before the next label is printed. For example, a value of 40 means that 40% of the backfeed takes place after the label is removed or cut. The remaining 60% takes place before the next label is printed. A value of "before" means that all backfeed takes place before the next label is printed.
 NEXT/SAVE	LABEL TOP	**Adjusting Label Top Position:** Press the (+) key to increase the value, press the (–) key to decrease the value. The displayed value represents dots. **Default:** +0 **Range:** –120 to +120 dot rows The label top position adjusts the print position vertically on the label. Positive numbers adjust the label top position further down the label (away from the printhead), negative numbers adjust the position up the label (toward the printhead).
 NEXT/SAVE	LEFT POSITION	**Adjusting Left Position:** Press the (–) key to move to the next position, press the (+) key to change between + and – and to increase the value of the digit. The displayed value represents dots. **Default:** 0000 **Range:** –9999 to +9999 **NOTE:** For a negative value, enter the value before changing to the minus sign. This parameter establishes how far from the left edge of a label the format begins to print by adjusting horizontal positioning on the label. Positive numbers adjust the printing to the left by the number of dots selected, negative numbers shift printing to the right.

 NEXT/SAVE	HEAD RESISTOR	**NOTE:** Depending on the model you have, this menu item may not be available. **Setting the Head Resistor Value:** Press the (–) key to move to the next digit position, press the (+) key to increase the value of the digit. **CAUTION:** This parameter should only be changed by qualified personnel! **Initial Value:** Factory-set to match the printhead shipped with your printer. **Default Value:** 0500 **Range:** 0500 to 1175 This value has been pre-set at the factory to match the resistance value of the printhead. It does not need to be changed unless the printhead is replaced. **CAUTION:** DO NOT set the value higher than that shown on the printhead. Setting a higher value may damage the printhead! Before replacing a printhead, look on the bottom of the printhead element for the label that shows the resistance value (ohm value).

Press	Display Shows	Action/Explanation
NEXT/SAVE	WEB S.	These parameters are automatically set during the calibration procedure. They should only be changed by a qualified service technician. Refer to the maintenance manual for more information on these parameters. Press the NEXT/SAVE key repeatedly to skip these parameters.
NEXT/SAVE	MEDIA S.	
NEXT/SAVE	RIBBON S.	
NEXT/SAVE	MARK S.	
NEXT/SAVE	MARK MED S.	
NEXT/SAVE	MEDIA LED	
NEXT/SAVE	RIBBON LED	
NEXT/SAVE	MARK LED	
NEXT/SAVE	LCD ADJUST	**LCD Display Adjustment:** Press the (–) key to decrease the value (reduce brightness), press the (+) key to increase the value (increase brightness). **Range:** 00 to 19 This parameter allows you to adjust the brightness of your display if your display is difficult to read.
NEXT/SAVE	FORMAT CONVERT	**Format Convert:** Press the (+) or (–) key to display other choices. **Default:** None **Selections:** None, 150 → 300, 150 → 600, 200 → 600, 300 → 600 Selects the bitmap scaling factor. The first number is the original dots per inch (dpi) value; the second, the dpi to which you would like to scale.

Press	Display Shows	Action/Explanation
NEXT/SAVE	IP RESOLUTION*	**IP Resolution:** Press the (+) or (–) key to display other choices. **Default:** Dynamic **Selections:** Dynamic, permanent Depending on the selection, allows either the user (”permanent”) or the server (”dynamic”) to select the IP address. For more information, refer to *ZebraNet Networking: PrintServer II Installation and User’s Guide*.
NEXT/SAVE	IP PROTOCOLS*	**IP Protocols:** Press the (+) or (–) key to display other choices. **Default:** All **Selections:** All, gleaning only, RARP, BOOTP, DHCP, DHCP/BOOTP If “dynamic” was chosen in the previous parameter, this selection determines the method(s) by which the PrintServer II receives the IP address from the server. For more information, refer to *ZebraNet Networking: PrintServer II Installation and User’s Guide*.
NEXT/SAVE	IP ADDRESS*	**IP Address:** Press the (–) key to move to the next digit position, press the (+) key to increase the value of the digit. This parameter allows you to select the IP address *if* “permanent” was chosen in “IP RESOLUTION.” (If “dynamic” was chosen, the user cannot select the address.) For more information, refer to *ZebraNet Networking: PrintServer II Installation and User’s Guide*.
NEXT/SAVE	SUBNET MASK*	**Subnet Mask:** Press the (+) or (–) key to display other choices. **Default:** Permanent (user *must* set) **Selections:** Dynamic (user *may* set, but server can assign), permanent This parameter selects the part of the IP address that is considered to be part of the local network. It can be reached without going through the default gateway.
NEXT/SAVE	DEFAULT GATEWAY*	**Default Gateway:** Press the (–) key to move to the next digit position, press the (+) key to increase the value of the digit. This parameter allows you to select the IP address that the network traffic is routed through if the destination address is not part of the local network.

* ZebraNet® PrintServer II option required

Press	Display Shows	Action/Explanation
PREVIOUS	LANGUAGE	**Selecting the Display Language:** Press the (+) or (–) key to display other choices. **Default:** English **Selections:** English, Spanish, French, German, Italian, Norwegian, Portuguese, Swedish, Danish, Dutch, Finnish, and Japanese This parameter allows you to change the language used on the front panel display.
You have completed the entire configuration and calibration sequence. You may either press the NEXT/SAVE key or the SETUP/EXIT key.		
NEXT/SAVE	DARKNESS	You are now back at the first parameter in the configuration sequence. **NOTE:** If you pressed the NEXT/SAVE key but are through programming the printer configuration, you may press the SETUP/EXIT key and continue with the "SAVE SETTINGS" function.
SETUP/EXIT	SAVE SETTINGS	**Save Settings:** Press the (+) or (–) key to display other choices. **Default:** Permanent **Selections:** Permanent, temporary, cancel, load defaults, load last save. This display appears when you attempt to exit the configuration mode. • Permanent: Permanently saves the changes, even when printer power is turned off. • Temporary: Saves the changes until changed again or until power is turned off. • Cancel: Cancels all changes since you entered the configuration mode except for darkness and tear-off position (if they were changed). • Load defaults: Loads factory defaults. **NOTE:** Loading factory defaults requires calibration. • Load last save: Loads the values from the last permanent save.
NEXT/SAVE	PRINTER READY	Press the NEXT/SAVE key to activate the displayed choice. You have exited the configuration and calibration sequence and are ready for normal printer operation.

Cleaning

Table 1 provides a brief cleaning schedule. Specific cleaning procedures are provided on the following pages.

Table 1

Area	Method	Interval
Printhead	Solvent*	Direct thermal print mode: After every roll of media (or 500'/152 m of fanfold media). Thermal transfer print mode: After every roll of ribbon.
Platen roller	Solvent*	
Transmissive sensor	Air blow	
Black mark sensor	Air blow	
Media path	Solvent*	
Ribbon sensor	Air blow	
Label available sensors	Air blow	Monthly
Tear-off/peel-off bar	Solvent*	As needed
Snap plate	Solvent*	
Cutter	Solvent*	
* Zebra recommends using a solvent containing 90% isopropyl alcohol.		

CAUTION: Use only the cleaning agents indicated. Zebra Technologies Corporation is not responsible for any other fluids being used on this printer.

Cleaning the Exterior

The exterior surfaces of the printer may be cleaned with a lint-free cloth. Do not use harsh or abrasive cleaning agents or solvents. If necessary, a mild detergent solution or desktop cleaner may be used sparingly.

Cleaning the Interior

Inspect this area after every four rolls of media. Remove any dirt and lint from the interior of the printer using a soft bristle brush and/or vacuum cleaner.

Cleaning the Printhead and Platen Roller

Inconsistent print quality, such as voids in the bar code or graphics, may indicate a dirty printhead. For best results, perform the following cleaning procedure after every roll of ribbon.

NOTE: You do not need to turn off the printer before cleaning the printhead. If power is turned off, all label formats and images, as well as any temporarily saved parameter settings stored in the printer's internal memory, are lost. When power is turned back on, you need to reload these items.

To clean the printhead, refer to Figure 27 and follow these steps:

1. Open the printhead.
2. Remove the media and ribbon (if loaded).
3. Moisten an applicator tip with solvent and wipe along the print elements from end to end. (The print elements are on the brown strip just behind the chrome strip on the printhead.) Allow a few seconds for the solvent to evaporate.

4. Rotate the platen roller and clean thoroughly with solvent and an applicator.
5. Brush/vacuum any accumulated paper lint and dust away from the rollers.
6. Reload ribbon and/or media, and close the printhead.

NOTE: If print quality has not improved after performing this procedure, try cleaning the printhead with *Save-a-Printhead* cleaning film. This specially-coated material removes contamination buildup without damaging the printhead. Call your authorized Zebra reseller/distributor for more information.

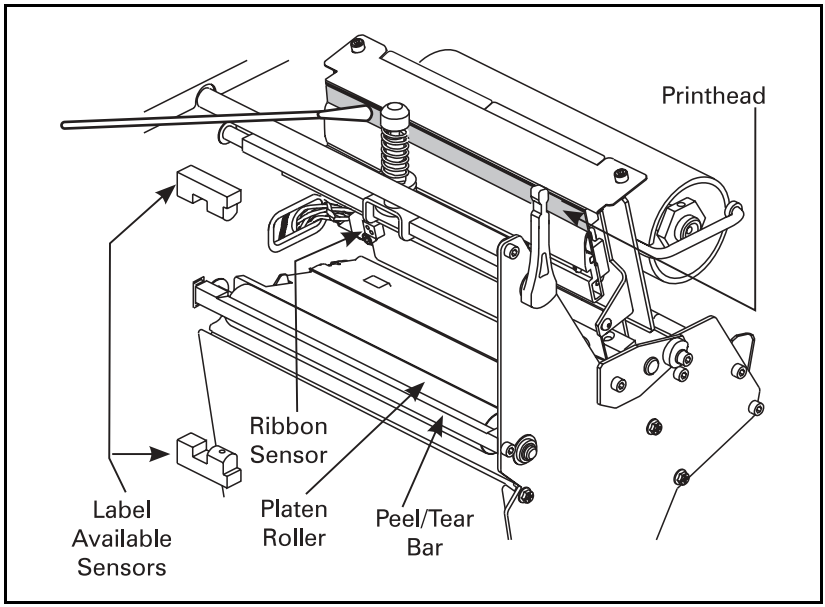


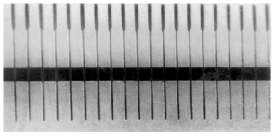
Figure 27

Extend the Life of Your Printhead With *Save-A-Printhead* Cleaning Film

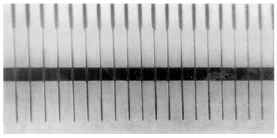
Challenge

The printhead is the most critical component in your printer, and possibly the most delicate. It is a consumable item just like the brakes on your car, which eventually wears over time. However, with ongoing careful attention and maintenance, you can extend the life of the printhead!

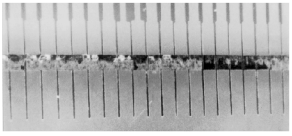
Below are photographs of three printheads. The first printhead is brand new. The second has printed over 1 million linear inches of thermal transfer labels and has been properly maintained. The third printhead has printed far fewer labels, but without proper care and maintenance, signs of abrasion and contamination build-up are evident.



New



Over 1 Million Inches (Properly Maintained)



Less Than 1 Million Inches (Without Proper Care)

Preventive Maintenance

For optimum performance, clean the printhead regularly after every roll of thermal transfer ribbon or after every roll of direct thermal labels. Take care when handling or cleaning the printhead by removing any jewelry that may scratch the printhead and use a grounding strap or anti-static mat to discharge static electricity that could damage the printhead.

To start, only use the pre-soaked (isopropyl alcohol) cleaning swabs provided in the preventive maintenance kit. First, turn off the printer and open the printhead. Lightly blow or brush away any loose dust and lint particles within the print mechanism (i.e. rollers, media/ribbon sensors, and printhead). NEVER use any hard, metallic, or abrasive objects-such as a screwdriver-to remove adhesives or other contaminants that may have built up on the printhead.

Next, press the swab tip against the printhead and swipe the print elements from end to end. Then, turn the platen rollers while wiping them from side to side. Repeat this step until the swab no longer shows dirt.

Avoid the Contributing Factors to Premature Printhead Failure

Abrasion- Over time, the movement of media/ribbon across the printhead wears through the protective ceramic coating, exposing and eventually damaging the print elements (dots).

In order to avoid abrasion:

- Clean your printhead frequently and use well-lubricated thermal transfer ribbons with backcoatings optimized to reduce friction.
- Minimize printhead pressure and burn temperature settings by optimizing the balance between the two.
- Ensure that the thermal transfer ribbon is as wide or wider than the label media to prevent exposing the elements to the more abrasive label material.

Ribbon Backcoating and Buildup- Printhead contamination from direct thermal media or thermal transfer ribbon may occur in applications requiring high burn settings, high head pressure, high speed, or high volume. This contamination builds up on the printhead elements, creating a barrier to the heat transformation required to produce high quality images. Contaminant buildup occurs gradually and results in poor print quality that may look like faded print or failed print element(s). This build up is very resistant to cleaning with the pre-soaked swabs and is difficult to remove.

In order to avoid ribbon backcoating and buildup:

- Use thermal transfer ribbons that have been specially cured to provide backcoat protection for high demand applications. These ribbons — sometimes referred to as anti-stick ribbons — also dissipate static and provide more lubrication.
- Follow the recommended Printhead Preventive Maintenance procedures.
- Use our *Save-a-Printhead* cleaning film to remove printhead contamination buildup quickly and easily.

Save-a-Printhead Cleaning Film

What is *Save-a-Printhead* cleaning film? A specially coated film that removes contamination buildup without damaging the printhead.

What are the benefits of Save-a-Printhead cleaning film?

- Extends the life of your printhead.
- Reduces maintenance downtime and the cost of replacing a printhead.
- An inexpensive, easy and quick way to remove contaminants without having to remove the printhead.

When should you use *Save-a-Printhead* cleaning film? When you see degrading print quality that looks like faded print or a failed print element(s) that cannot be corrected by cleaning with the pre-soaked cleaning swabs.

How to Use *Save-a-Printhead* Cleaning Film

1. Remove power from the printer.
2. Open the printhead, remove media and ribbon from the print mechanism.
3. Clean the printhead per the recommended Preventive Maintenance procedures.
4. Position the Save-a-Printhead film in the print path, placing the glossy side down away from the printhead (matte side up).
5. Close and latch the printhead.
6. Slowly pull the full length of the film through the print mechanism.
7. Clean the printhead per the recommended Preventive Maintenance procedures a second time.
8. Reload media and ribbon, close and latch the printhead.
9. Print labels and inspect for improved print quality. If quality has not improved, contact our Technical Support staff.

- Only one pass is required to remove contamination buildup.
- Each strip of film can be used up to 10 times.
- Discard the strip when residue buildup or other contamination is apparent.

NOTE: In the case that a replacement printhead is needed, product from the Original Equipment Manufacturer (OEM) is strongly recommended to ensure that your printer and part warranties remain intact, and that the product performs optimally.

How to Order *Save-a-Printhead* Cleaning Film Kits

There are 5 kits to accommodate the different width printers. Each kit contains three 10" long strips of film. Reference the following table to order the kit for your printer:

Order kit number:	For Printers with Print Widths:
46902	3.0"-4.0"
44902	4.0"-5.0"
48902	5.0"-6.0"
38902	6.0"-7.0"
22902	8.0"-9.0"

Cleaning the Sensors

The media, ribbon, and label available sensors should be cleaned on a regular basis to ensure proper operation of the printer. To locate these sensors, refer to Figure 27 on page 67, Figure 6 on page 11, and Figure 7 on page 12. Brush/vacuum any accumulated paper lint and dust off of these sensors.

Cleaning the Snap Plate

Clean the snap plate to remove label adhesive or a label that has adhered to the underside of the snap plate.

Refer to Figure 28.

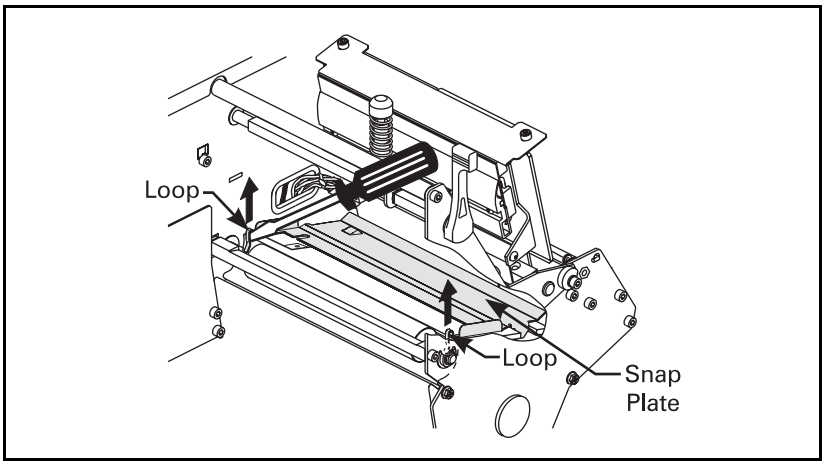


Figure 28

1. Insert a small-blade screwdriver or similar tool into the loop on the left side of the snap plate. Lift the snap plate.

CAUTION: Do not bend, twist, or otherwise deform the loops! If the snap plate is damaged in any way, a new plate may be required for proper ribbon sensing.

2. Repeat step one on the right side of the snap plate.
3. Remove the snap plate from the printer.
4. Clean the snap plate with cleaning solvent and a soft cloth.

Refer to Figure 29.

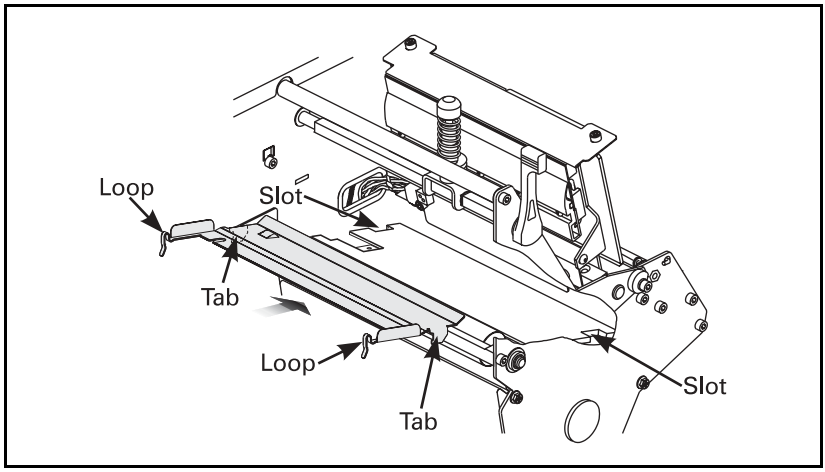


Figure 29

5. To reinstall the snap plate, insert the two tabs on the bottom of the snap plate into the two slots of the media pathway.
6. Slide the snap plate toward you.
7. Press down on the loops to lock the snap plate into place.

Cleaning the Cutter Module

(For printers equipped with the optional cutter.)

If labels are not being cut properly or if the cutter jams with labels, turn off the printer power and unplug the printer. Then, clean the stationary cutter blade with cleaning solvent. This removes label adhesive and/or paper debris. If further cutter cleaning is necessary, or if the cutter continues to perform unsatisfactorily, contact an authorized service technician.

NOTE: Turning off the printer results in the loss of label formats, images, and any temporarily saved parameter settings stored in the printer's internal memory. Perform this procedure after your printing job is complete!

Lubrication

CAUTION: No lubricating agents other than Zebra-supplied, silicon-only lubricants should be used on the spindle felt clutches of this printer! Other commercially available lubricants damage the finish and mechanical parts if used.

Fuse Replacement

The printer uses a metric-style fuse (5 x 20 mm IEC) rated at F5A, 250V. The end caps of the fuse must bear the certification mark of a known international safety organization (see Figure 37 on page 97).

Depending on the model you have, the fuse may not be user-replaceable (see Figure 30) and may need to be replaced by a qualified service technician. Please see the maintenance manual (part # 32056L) for details.

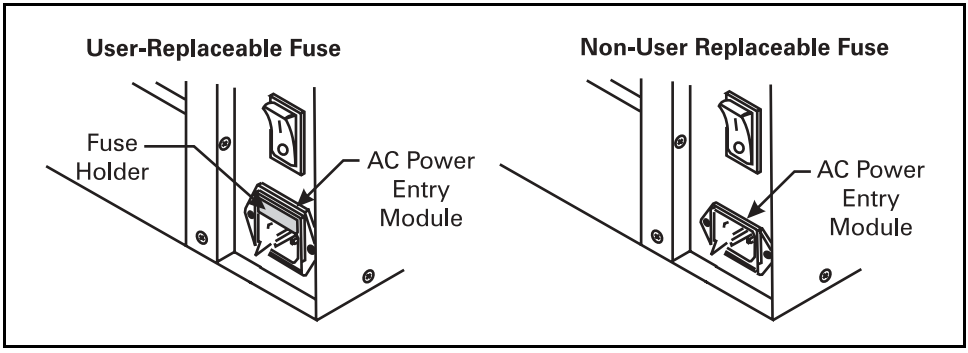


Figure 30

NOTE: Models with a user-replaceable fuse have a warning label next to the fuse for easy identification.

Adjustments

Toggle Positioning

The toggle should be positioned so that it provides even pressure on the media. Position the toggle by sliding it to the desired location (see Figure 31).

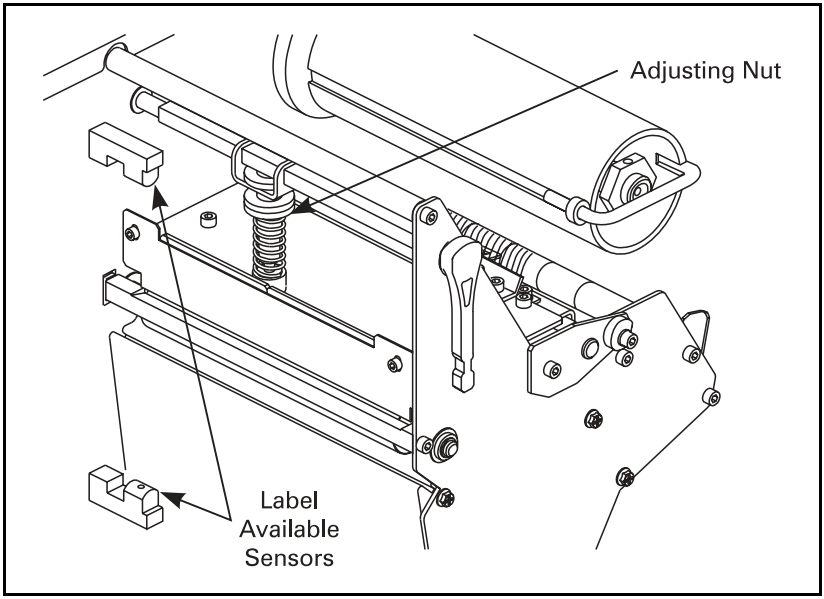


Figure 31

Printhead Pressure Adjustment

This adjustment may be necessary if printing is too light on one side or if thick media is used. Refer to Figure 31.

1. Perform the toggle positioning procedure. If the problem is solved, you may stop here; otherwise, continue with the rest of this procedure.
2. Print some labels at speed A by running the PAUSE Key Self Test (see page 87).
3. While printing labels, lower the darkness setting until a gray level of printing is seen.
4. Loosen the knurled (upper) locking nuts at the top of the toggle assembly/assemblies.
5. Increase or decrease spring pressure using the knurled (lower) adjusting nuts on the shafts of the toggle until the left and right edges of printed area are equally dark.

NOTE: Printhead life can be maximized by using the lowest pressure that produces the desired print quality.

6. Increase darkness setting to the optimum level for the media being used.
7. Retighten locking nuts.

Media Sensor Position Adjustment

See “Positioning the Media Sensors” on page 10.

LED Error Conditions and Warnings

Error Condition — Ribbon Out

Problem	Solution
In thermal transfer mode, the ribbon is not loaded *or* loaded incorrectly.	Load the ribbon correctly. See “Ribbon Loading” on page 40.
In thermal transfer mode, the ribbon sensor is not sensing correctly loaded ribbon.	Perform the media and ribbon sensor calibration (see page 17).
In direct thermal mode, when ribbon is not used:	Put the printer in direct thermal mode via the front panel and remove ribbon (if loaded).
	Ensure that the printer driver or software settings are correctly set (if applicable).

Error Condition — Paper Out

Problem	Solution
The media is not loaded *or* loaded incorrectly.	Reload the media. Refer to “Roll Media Loading” on page 29.
The media sensor is not adjusted properly.	Check the position of the upper and lower media sensors. See “Positioning the Media Sensors” on page 10.
The printer is set for non-continuous media, but continuous media is loaded.	Either load the correct media or set the printer for the correct media type via the front panel.
	Ensure that the printer driver or software settings are correctly set (if applicable).
	Calibrate the printer (see page 17).
The incorrect media sensor is being used.	Via the front panel, check the sensor type to ensure that the correct one is used for the media loaded. See page 16. Calibrate the printer (see page 17).
The maximum label length is set shorter than the label length being used.	Via the front panel, set the label length to a value that is slightly longer than the length of the label being used.

Error Condition — Head Open

Problem	Solution
The printhead is not fully closed.	Close the printhead.

Warning — Ribbon In

Problem	Solution
The ribbon is loaded.	Remove the ribbon and set the printer to direct thermal mode.
	Ensure that the printer driver and/or software settings are correctly set (if applicable).

Warning — Head Too Hot

Problem	Solution
The printhead is over temperature.	Allow the printer to cool. Printing automatically resumes when the printhead elements cool to an acceptable operating temperature.

Warning — Head Cold

Problem	Solution
The printhead is under temperature.	Continue printing while the printhead reaches the correct operating temperature. If the error remains, the environment may be too cold for proper printing. Relocate the printer to a warmer area.
Printhead data cable is not properly connected.	**WARNING:** The printhead can be very hot and can cause severe burns. Allow the printhead to cool. Disconnect and reconnect data cable to the printhead. Ensure that the cable connector is fully inserted into the printhead connector.

Warning — Cutter Jammed

Problem	Solution
Cutter blade is in the media path.	Turn off the printer power and unplug the printer. Inspect the cutter module for debris and clean as needed following the cleaning instructions on page 74.

Out of Memory*

Problem	Solution
*There is not enough memory to perform the function shown on the second line of the error message.	Insufficient memory for the label length, downloaded fonts/ graphics, and images.
	Ensure that the device, such as FLASH memory or PCMCIA card is installed and not write protected or full.
	Ensure that the data is not directed to a device that is not installed or available.

Print Quality Problems

General Print Quality Issues

Problem	Solution
You are using an incorrect media and ribbon combination for your application.	Consult your authorized Zebra reseller/distributor for information and advice.
The printer is set at the incorrect print speed.	For optimal print quality, set the print speed to the lowest possible setting via ZPL II, the driver, or the software.
The printer is set at the incorrect darkness level.	For optimal print quality, set the darkness to the lowest possible setting via the front panel, the driver, or the software.
The printhead is dirty.	Clean the printhead according to the instructions on page 66.
There is light printing (or no printing) on the left or right side of the label *or* the printed image is not sharp.	The toggle pressure needs to be adjusted. Follow the printhead pressure adjustment instructions on page 77.

Gray lines on blank labels with no consistent pattern

Problem	Solution
The printhead is dirty.	Clean the printhead according to the instructions on page 66.

Light, consistent vertical lines running through all of the labels

Problem	Solution
The printhead or platen roller is dirty.	Clean the printhead, platen roller, or both according to the instructions on page 66.

Intermittent creases on the left and right edges of the labels

Problem	Solution
There is too much toggle pressure on the printhead.	Reduce the toggle pressure. See “Printhead Pressure Adjustment” on page 77.

Wrinkled Ribbon

Problem	Solution
The ribbon is not loaded correctly.	Load the ribbon correctly. See “Ribbon Loading” on page 40.
The darkness setting is incorrect.	Set the darkness to the lowest possible setting for good print quality. See “DARKNESS” on page 46.
Incorrect printhead pressure or balance.	Set the pressure to the minimum required for good print quality. See “Printhead Pressure Adjustment” on page 77.
The media is not feeding correctly. It is “walking” from side to side.	Make sure that the media guide and media supply guide touch the edge of the media.

Communications

A label format was sent to the printer but not recognized. The DATA light does not flash.

Problem	Solution
The communication parameters are incorrect.	Check the printer driver or software communications settings (if applicable).
	Check the printer host port setting via the front panel (see page 56). Select the port that matches the one being used by the host.
	Ensure you are using the correct communication cable. See page 23 for the requirements.
	Via the front panel, check the protocol setting. It should be set to “none.” See page 55.
	Ensure that the correct driver is being used, if applicable.

A label format was sent to the printer. Several labels print, then the printer skips, misplaces, misses, or distorts the image on the label.

Problem	Solution
The host is set to EPP parallel communications.	Change the settings on the computer host to standard parallel communications.
The serial communication settings are incorrect.	Ensure that the flow control settings match.
	Check the communication cable length. See page 23 for requirements.
	Check the printer driver or software communications settings (if applicable).

A label format was sent to the printer but not recognized. The DATA light flashes but no printing occurs.

Problem	Solution
The prefix and delimiter characters set in the printer do not match the ones in the label format.	Verify the prefix and delimiter characters. See page 57.
Incorrect data is being sent to the printer.	Ensure that ZPL is being used.
	Check the communication settings on the computer. Ensure that they match the printer settings.

The printer fails to calibrate or detect the top of the label.

Problem	Solution
The printer was not calibrated for the label being used.	Perform the calibration procedure on page 17.
The printer is configured for continuous media.	Set the media type to non-continuous media.
The driver or software configuration is not set correctly.	As driver or software settings produce ZPL commands that can overwrite the printer configuration, check the driver or software media-related setting.

Printer Diagnostics

Power-On Self Test

A full Power-On Self Test (POST) is performed automatically each time the printer is turned on (additional self tests can be performed by pressing the CANCEL key when you turn the printer on). During either test sequence, the front panel lights and liquid crystal display (LCD) monitor the progress of the POST. If the printer fails any of these tests, the word "FAILED" is added to the display. If this occurs, notify an authorized Zebra reseller.

Additional Printer Self Tests

These self tests produce sample printouts and provide specific information that help determine the operating conditions for the printer.

Each self test is enabled by pressing a specific front panel key or combination of keys while turning the POWER switch on. Keep the key(s) depressed until the DATA light turns off. When the power-on self test is complete, the selected self test starts automatically.

NOTE: When performing self tests, avoid sending a label format to the printer. In the case of a remote host, disconnect all data interface cables from the printer.

NOTE: When canceling a self test prior to its actual completion, always turn the printer power off and then back on to reset the printer.

NOTE: When performing these self tests while in the peel-off mode, you must remove the labels as they become available.

NOTE: If your media is not wide enough or long enough, unexpected and/or undesired results may occur. Make sure that your print width is set correctly for the media you are using before you run any self tests, otherwise the test may print out on the platen roller. See page 48 for information on setting the print width.

CANCEL Key Self Test

This self test prints a listing of the configuration parameters currently stored in the printer's memory. See Figure 32 (depending on the options ordered, your label may look different).

1. Turn the printer off.
2. Press and hold the CANCEL key while turning on the power.

The configuration may be changed either temporarily (for specific label formats or ribbon and label stock) or permanently (by saving the new parameters in memory). Saving new parameters occurs whenever a calibration procedure is performed. Refer to page 15 for further information about the configuration procedure. Additional Power-Up Self Tests are also performed during the POST for this test.

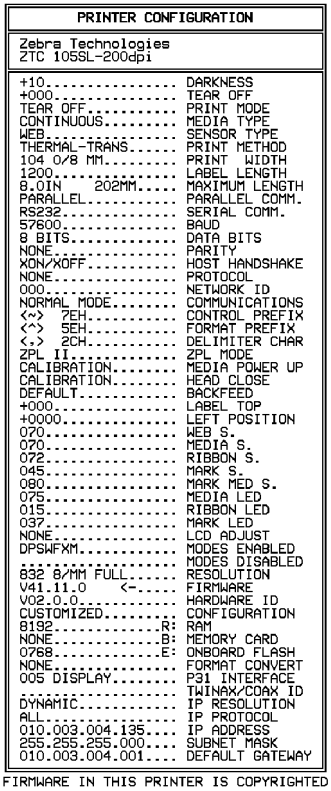


Figure 32

PAUSE Key Self Test

This self test can be used to provide the test labels required when making adjustments to the printer's mechanical assemblies; these test labels also ensure the printhead has been aligned correctly after it has been adjusted. See the sample printout in Figure 33.

1. Turn off the printer.
2. Press and hold the PAUSE key while turning on the power.
    - The initial self test prints 15 labels at 2.4"/61 mm per second, then automatically pauses the printer. Each time the PAUSE key is pressed, an additional 15 labels print.
    - While the printer is paused, pressing the CANCEL key alters the self test. When the PAUSE key is pressed, the printer prints 15 labels at 6"/152 mm per second.
    - While the printer is paused, pressing the CANCEL key again alters the self test again. When the PAUSE key is pressed, the printer prints 50 labels at 2.4"/61 mm per second.
    - While the printer is paused, pressing the CANCEL key again alters the self test a third time. When the PAUSE key is pressed, the printer prints 50 labels at 6"/152 mm per second.
    - While the printer is paused, pressing the CANCEL key again alters the self test a fourth time. When the PAUSE key is pressed, the printer prints 15 labels at the printer's maximum speed.
    - To exit this self test at any time, press and hold the CANCEL key.

Figure 33

FEED Key Self Test

See Figure 34.

1. Turn off the printer.
2. Press and hold the FEED key while turning on the power.

The FEED Key Self Test prints out at various darkness settings above and below that of the darkness value shown on the configuration label. Examine these labels and determine which one has the best darkness setting for your application. This value can be entered into the printer by setting the darkness during the configuration procedure. Refer to page 46 for more information.

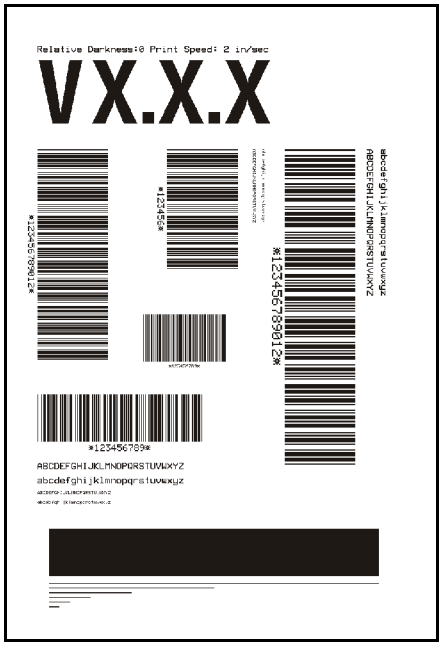


Figure 34

The value printed on that label is added to (plus) or subtracted from (minus) the darkness value specified on the configuration label. The resulting numeric value (0 to 30) is the best darkness value for that specific media/ribbon combination.

FEED Key and PAUSE Key Self Test

1. Turn off the printer.
2. Press and hold the FEED and PAUSE keys while turning on the power.

Performing this self test temporarily resets the printer configuration to the factory default values. These values are active only until power is turned off unless you save them permanently in memory.

Communications Diagnostics Test

This test is controlled from the front panel display. Refer to page 56. A typical printout from this test is shown in Figure 35. Turn off the power to exit this self test.

NOTE: This label is inverted when printed.

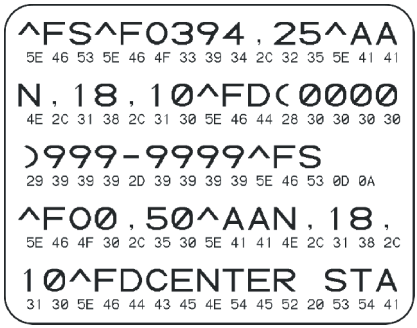


Figure 35

Additional Printer Diagnostics

Additional diagnostic tests are available for this printer, however, they are beyond the scope of this user's guide. Refer to the maintenance manual for information about these additional tests.

Specifications

NOTE: Printer specifications are subject to change without notice.

Media Handling

- **Tear-off** mode: Labels are produced in strips.
- **Peel-off** mode: Labels are dispensed and peeled from the liner as needed.
- **Cutter** mode: Labels are printed and individually cut.
- **Rewind** mode: Labels are rewound internally.

Options

• Print head 300 dpi (12 dots/mm)	• Font cards
• Cutter and catch tray*	• PCMCIA Card Slot
• Rewind	• Bar-One® Windows™-based WYSIWYG on-screen label design and print application software
• Label peel and liner rewind	• ZebraNet® PrintServer II, including Ethernet interface (10Base-T), ZebraLink™ WebView graphical setup and printer control, and ZebraLink™ Alert unsolicited error notification
• Internal fan-fold media supply bin*	• IBM® twinax or coax interface

* Not compatible with rewind and peel options.

ZPL Programming Language (ZPL II®)

• Downloadable graphics, scalable and bitmap fonts, and label formats	• Status message to host upon request
• Object copying between memory areas (RAM, memory card, and internal FLASH)	• Programmable quantity with print, pause, and cut control
• Code Page 850 character set	• Communicates in printable ASCII characters
• Adjustable print cache	• Error-checking protocol
• Data compression	• Controlled via mainframe, mini-computer, PC, portable data terminal
• Automatic virtual input buffer management	• Serialized fields
• Format inversion	• In-spec OCR-A and OCR-B
• Mirror image printing	• UPC/EAN
• Four-position field rotation (0°, 90°, 180°, 270°)	• User-programmable password
• Slew command	

Bar Codes

• Bar code ratios (2:1 up to 3:1)	• Industrial 2of 5 (supports ratios of 2:1 up to 3:1, Modulus 10 Check Digit)
• Code 11	• Interleaved 2 of 5
• Code 39 (supports ratios of 2:1 up to 3:1)	• LOGMARS
• Code 93	• MSI
• Code 128 (with subsets A, B, and C and UCC case codes)	• Codabar
• ISBT-128	• Codablock (2-dimensional bar code)
• UPC-A, UPC-E, UPC extensions	• PDF-417 (2-dimensional bar code)
• EAN-8, EAN-13, EAN extensions	• Code 49 (2-dimensional bar code)
• Plessey	• DataMatrix (2-dimensional bar code)
• Postnet	• Maxi Code (2-dimensional bar code)
• Standard 2of 5	• QR Code (2-dimensional bar code)
• Check digit calculation where applicable	

General Specifications

General Specifications			105*SL*	
Height			15.5"	394 mm
Width			11.2"	284 mm
Depth			18.9"	480 mm
Weight (without options)			55 lb	25 kg
Electrical	General (auto adjusting)		90-264 VAC; 48-62 Hz	
	Power Consumption	Printing PAUSE test label at slowest speed	180 W	
		Printer idle	19 W	
	Compliance		Complies with FCC class “B” and Canadian Doc. class “A” rules. Carries the CE mark of compliance.	
Temperature	Operating environment	Thermal transfer	40° to 104° F	5° to 40° C
		Direct thermal	40° to 104° F	5° to 40° C
	Storage		–40° to 140° F	–40° to 60° C
Relative Humidity	Operating environment		20% to 85% non-condensing	
	Storage		5% to 85% non-condensing	

Printing Specifications

Printing Specifications			105*SL*
Resolution			203 dots/inch (8 dots/mm)/ 300 dots/inch (12 dots/mm)
Dot size (width x length)			0.0049" x 0.0049" (0.125 mm x 0.125 mm)/ 0.0033" x 0.0039" (0.084 mm x 0.10 mm)
First dot location measured from inside media edge			0.10" ± 0.035" (2.5 mm ± 0.89 mm)
Maximum print width			4.1" (104 mm)
Print Length (maximum)	Continuous printing	203 dpi	90" (2286 mm)
		300 dpi	41" (1041 mm)
Media registration toleration* (non-continuous media)		Vertical	= ≤ ±0.050" (1.3 mm)
		Horizontal	= ≤ ±0.050" (1.3 mm)
Programmable print speeds		203 dpi	2.4" (61 mm) through 8.0" (203 mm) per second in 1" increments
		300 dpi	2.4" (61 mm) through 8.0" (203 mm) per second in 1" increments
Bar code modulus ("X") dimension	Ladder (rotated) orientation	203 dpi	4.9 mil to 49 mil
		300 dpi	3.9 mil to 39 mil
	Picket fence (non-rotated) orientation	203 dpi	4.9 mil to 49 mil
		300 dpi	3.3 mil to 33 mil
Thin film printhead with Element Energy Equalizer (E3)®			Yes

* Media registration and minimum label length are affected by media type and width, ribbon type, and print speed. Performance improves as these factors are optimized. Zebra recommends always qualifying any application with thorough testing.

Ribbon Specifications

Ribbon Specifications			105*SL*
Ribbon must be wound with the coated side out.			
Ribbon width (Zebra recommends using ribbon at least as wide as the media to protect the printhead from wear.)		Minimum	0.79" (20 mm)
		Maximum	4.1" (104 mm)
Standard lengths	2:1 media to ribbon roll ratio		984 ft. (300 m)
	3:1 media to ribbon roll ratio		1476 ft. (450 m)
Ribbon core inside diameter			1.0" (25.4 mm)
Maximum ribbon roll outside diameter			3.2" (81.3 mm)

Font Specifications

203 dpi (8 dots/mm)				
Fonts	**Matrix (in dots) (H x W)**	**Type***	**Minimum Char. Size (H x W)**	**Maximum C.P.I.**
A	9 x 5	U-L-D	0.044" x 0.029"	33.9
B	11 x 7	U	0.054" x 0.044"	22.6
C,D	18 x 10	U-L-D	0.088" x 0.059"	16.9
E	28 x 15	OCR-B	0.138" x 0.098"	10.1
F	26 x 13	U-L-D	0.128" x 0.079"	12.7
G	60 x 40	U-L-D	0.295" x 0.236"	4.2
H	21 x 13	OCR-A	0.103" x 0.093"	10.7
GS	24 x 24	SYMBOL	0.118" x 0.118"	8.4
∅	variable	U-L-D	variable	N/A

300 dpi (12 dots/mm)				
Fonts	**Matrix (in dots) (H x W)**	**Type***	**Minimum Char. Size (H x W)**	**Maximum C.P.I.**
A	9 x 5	U-L-D	0.030" x 0.020"	50.0
B	11 x 7	U	0.037" x 0.030"	33.3
C,D	18 x 10	U-L-D	0.060" x 0.040"	25.0
E	41 x 20	OCR-B	0.137" x 0.087"	11.5
F	26 x 13	U-L-D	0.087" x 0.052"	18.8
G	60 x 40	U-L-D	0.200" x 0.160"	6.3
H	30 x 19	OCR-A	0.100" x 0.093"	10.7
GS	24 x 24	SYMBOL	0.080" x 0.080"	12.5
∅	variable	U-L-D	variable	N/A

* U = Uppercase; L = Lowercase; D = Descenders

- Bitmap fonts A through H and GS symbols are expandable up to 10 times, height and width independent.
- Smooth scalable font ∅ (CG Triumvirate™ Bold Condensed) is expandable dot-by-dot, height and width independent.
- IBM® Code Page 850 International Characters.

Media Specifications

Media Specifications			105*SL*
Minimum label length*		Tear-off	0.7" (18 mm)
		Peel-off	0.5" (13 mm)
		Cutter	1.5" (38 mm)
		Rewind	0.25" (6 mm)
Total media width (label + liner, if any)		Minimum	0.79" (20 mm)
		Maximum	4.52" (115 mm)
Total thickness (includes liner, if any)		Minimum	0.003" (0.076 mm)
		Maximum	0.012" (0.305 mm)
Cutter maximum full-width media thickness			0.009" (0.229 mm)
Roll media core inside diameter			3" (76 mm)
Maximum roll diameter			8.0" (203 mm)
Inter-label gap		Minimum	0.079" (2 mm)
		Preferred	0.118" (3 mm)
		Maximum	Maximuminter-labelgap= 2 x (label length for which you have calibrated the printer) + 1"
Maximum internal fanfold media pack size (label + liner) L x W x H			8.0" x 4.5" x 4.5" (203 mm x 114 mm x 114 mm)
Ticket/tag sensing notch L x W			0.12" x 0.25" (3 mm) x (6 mm)
Ticket/tag sensing hole diameter			0.125" (3 mm)
Additional specifications for black mark sensing	Mark length (measuring parallel to label/tag edge)	Minimum	0.12" (3 mm)
		Maximum	0.43" (11 mm)
	Mark width (measuring to perpendicular label/ tag edge)	Minimum	≥ 0.43" (≥ 11 mm)
		Maximum	Full media width
	Mark location		Marks must be located within 0.040" (1 mm) of the inside media edge.
	Mark density		>1.0 Optical Density Unit (ODU)
	Maximum density of the back of the media on which the black mark is printed		0.5 ODU

* Media registration and minimum label length are affected by media type and width, ribbon type, print speed, and printer mode of operation. Performance improves as these factors are optimized. Zebra recommends always qualifying any application with thorough testing.

Power Line Cord Specifications

- The overall length must be less than 9.8 feet (3.0 meters).
- It must be rated for at least 5 A, 250 V.
- The chassis ground (earth) MUST be connected to assure safety and reduce electromagnetic interference. The ground connection is handled by the third wire (earth) in the power line cord. See Figure 36.
- The AC power plug and IEC 320 connector must bear the certification mark of at least one of the known international safety organizations shown in Figure 37.

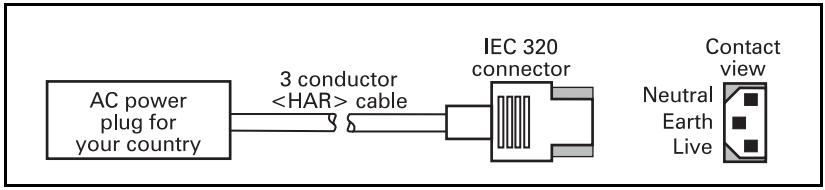


Figure 36

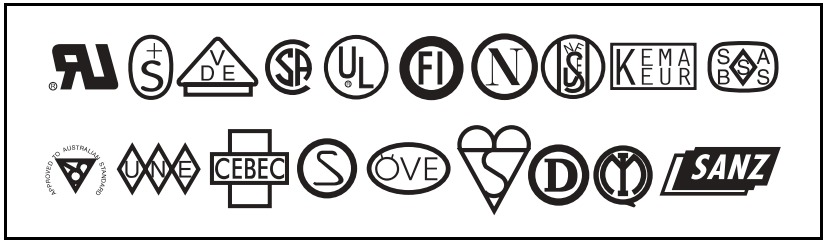


Figure 37

Appendix A: DB25 Connectors

Printer Interface Technical Information

RS-232/RS-422/RS-485 Serial Data Port

The connections for these standard interfaces are made through the DB25S connector on the rear panel. For all RS-232 input and output signals, the printer follows both the Electronics Industries Association's (EIA) RS-232 specifications and the Consultative Committee for International Telegraph and Telephone (CCITT) V.24 standard signal level specifications.

Table 2 shows the pin configuration and function of the rear panel serial data connector on the printer.

Table 2

Pin No.	Description
1	FG (frame ground) for cable shield
2	TXD (RS-232 transmit data) output from printer
3	RXD (RS-232 receive data) input to printer
4	RTS (RS-232 request to send) output from printer
6	DSR (data set ready) input to printer
7	SG (signal ground) for RS-232
9	+5 VDC source output (1 Amp maximum)
11	SGR (signal ground reference) for RS-422/RS-485
13	Data input B(-); RS-422/RS-485
14	Data output B(-); RS-422/RS-485
16	Data input A(+); RS-422/RS-485
19	Data output A(+); RS-422/RS-485
20	DTR (RS-232 data terminal ready) output from printer
	NOTE: Pins 5, 8, 10, 12, 15, 17-18, 21-25 are unused and unterminated.

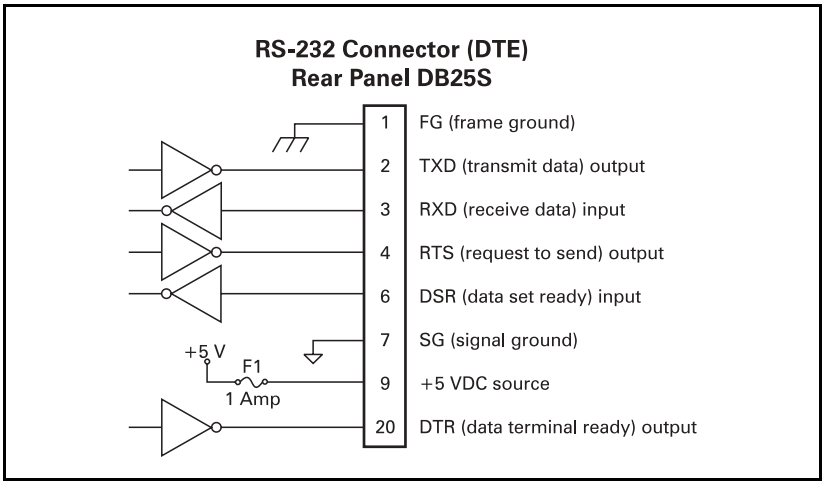


Figure 38

RS-232 Interconnections

The printer is configured as Data Terminal Equipment (DTE). Figure 38 illustrates the internal connections of the printer's RS-232 connector.

Figure 39 illustrates the connections required to interconnect the printer with the standard 9-pin serial port connector on a computer.

NOTE: If using a 9-pin to 25-pin adapter plug attached to the computer, use a null modem cable between the adapter plug and the printer.

NOTE: To connect the printer to other DTE devices with DB25 connectors (such as the serial port of a PC), an RS-232 null modem (crossover) cable should be used.

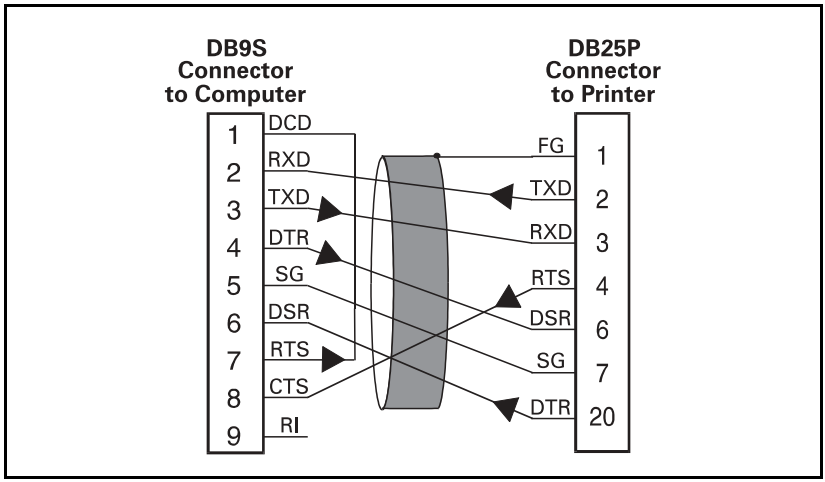


Figure 39

When the printer is connected via its RS-232 interface to Data Communication Equipment (DCE) such as a modem, use a standard RS-232 (straight-through) interface cable. Figure 40 illustrates the connections required for this cable.

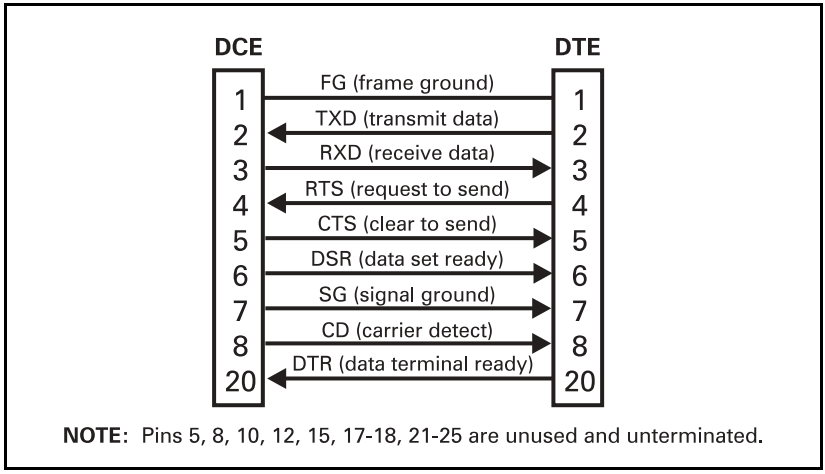


Figure 40

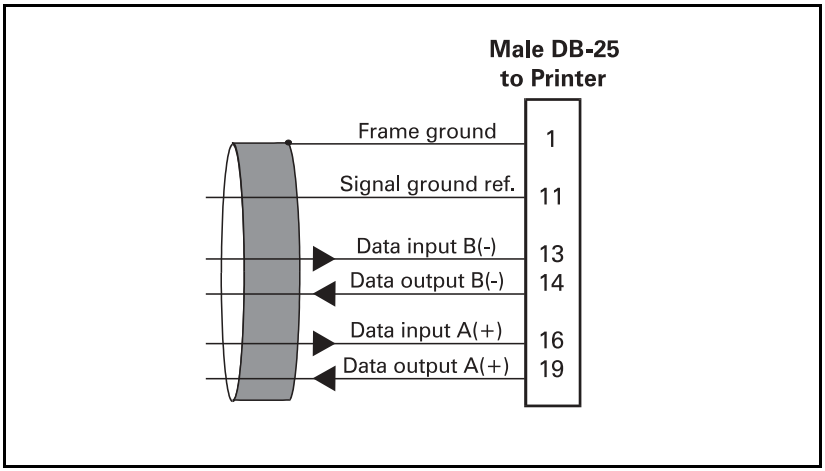


Figure 41

RS-422/RS-485 Interconnections

The printer may be connected to a host computer by either an RS-422 or an RS-485 interface. The DB25 connector on the rear of the printer uses specific pins for this purpose. Figure 41 illustrates the required cable wiring for interconnecting to the printer's DB25 connector. Figure 42 illustrates the internal connections of the printer's RS-422 or RS-485 connector.

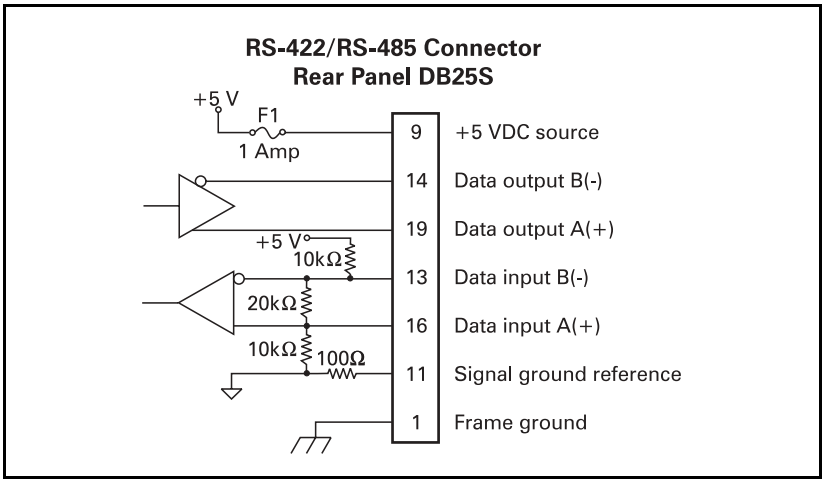


Figure 42

Parallel Data Port

A standard 36-pin parallel connector is available at the rear of the printer for connection to the data source. Under normal circumstances, data sent from the printer to the host computer in response to a "Printer Status Request" command is sent through the RS-232 serial port. However, if the host computer has a properly configured IEEE-1284 parallel port that is recognized by the printer, status information is returned through the parallel port. Port selection for status information is determined each time the printer is turned on.

Parallel Port Interconnections

Table 3 shows the pin configuration and function of a standard computer-to-printer parallel cable.

Table 3

36-pin Connector	Description
1	nStrobe/HostClk
2-9	Data Bits 1-8
10	nACK/PtrClk
11	Busy/PtrBusy
12	PError/ACKDataReq
13	Select/Xflag
14	nAutoFd/HostBusy
15	Not used
16 & 17	Ground
18	+5V @ 1A
19-30	Ground
31	ninit
32	nFault/NDataAvail
33 & 34	Not used
35	+5V through a 4.7 KW Resistor
36	NSelectin/1284 active

Appendix B: DB9 Connectors

Printer Interface Technical Information

RS-232 Serial Data Port

The connection for this standard interface is made through the female DB9 connector on the rear panel. A DB9 to DB25 interface module is required for all RS-232 connections through a DB25 cable (see page 108 for details).

For all RS-232 input and output signals, the printer follows both the Electronics Industries Association's (EIA) RS-232 specifications and the Consultative Committee for International Telegraph and Telephone (CCITT) V.24 standard signal level specifications.

Table 4 shows the pin configuration and function of the rear panel serial data connector on the printer.

Table 4

Pin No.	Name	Description
1	—	Not connected
2	RXD	Receive data — data input to printer
3	TXD	Transmit data — data output from printer
4	DTR	Data terminal ready — output from printer
5	SG	Signal ground
6	DSR	Data set ready — input to printer
7	RTS	Request to send — output from printer
8	CTS	Clear to send — input to printer
9	+5VDC	+5VDC signal output **NOTE:** This pin is also available as a +5VDC power source at 750mA. To enable this capability, a jumper on the computer's main logic board needs to be installed on JP1, pins 2 and 3.

NOTE: An interface module is required for RS-422/RS-485 interface support (see page 109).

RS-232 Interface Connections

The printer is configured as Data Terminal Equipment (DTE). Figure 43 illustrates the internal connections of the printer's RS-232 connector.

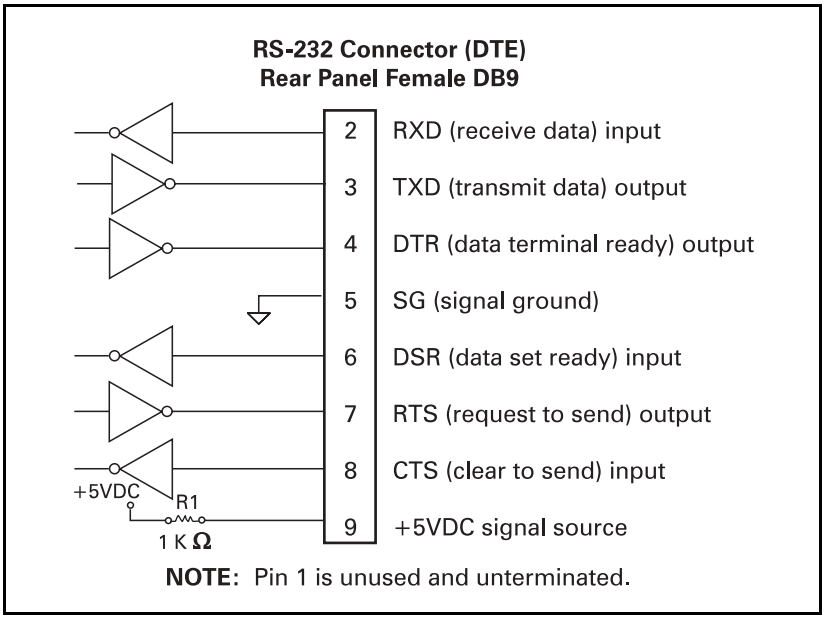

RS-232 Connector (DTE)
Rear Panel Female DB9
2 RXD (receive data) input
3 TXD (transmit data) output
4 DTR (data terminal ready) output
5 SG (signal ground)
6 DSR (data set ready) input
7 RTS (request to send) output
8 CTS (clear to send) input
9 +5VDC signal source
+5VDC
R1
1 K Ω
NOTE: Pin 1 is unused and unterminated.

Figure 43

NOTE: The cable used to connect the printer to a computer must be a null modem (crossover) cable. If you want to connect the printer to any other DTE devices, a null modem cable must also be used.

When the printer is connected via its RS-232 interface to Data Communication Equipment (DCE) such as a modem, use a standard RS-232 (straight-through) interface cable. Figure 44 illustrates the connections required for this cable.

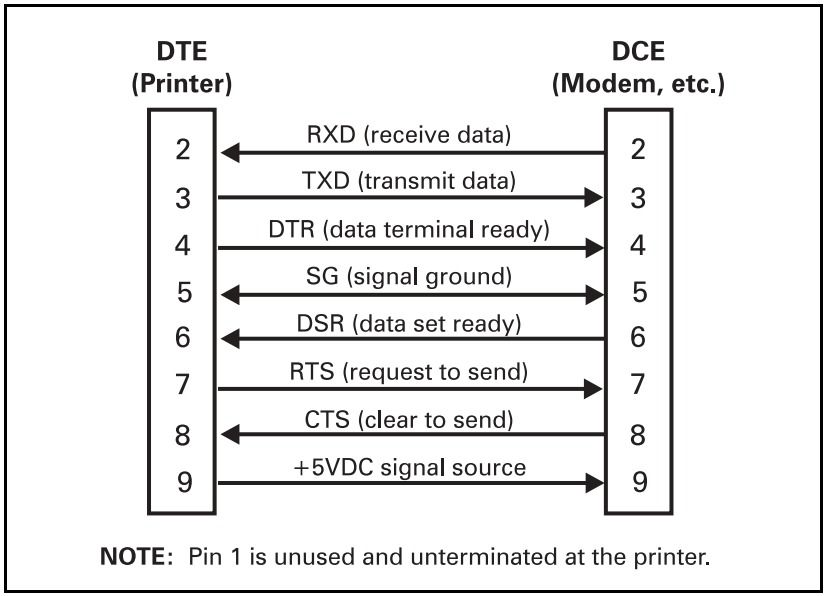


Figure 44

RS-232 Interconnections Using a DB25 Cable

In order to connect the printer's RS-232 DB9 interface to a DB25 connector, an interface adapter is required (Zebra part # 33138). A generic DB25 adapter may also be used, however the +5VDC signal source would not be passed through. Figure 45 illustrates the connections required for the DB9 to DB25 interface.

NOTE: The cable used to connect the printer to a computer must be a null modem (crossover) cable. If you want to connect the printer to any other DTE devices, you must also use a null modem cable.

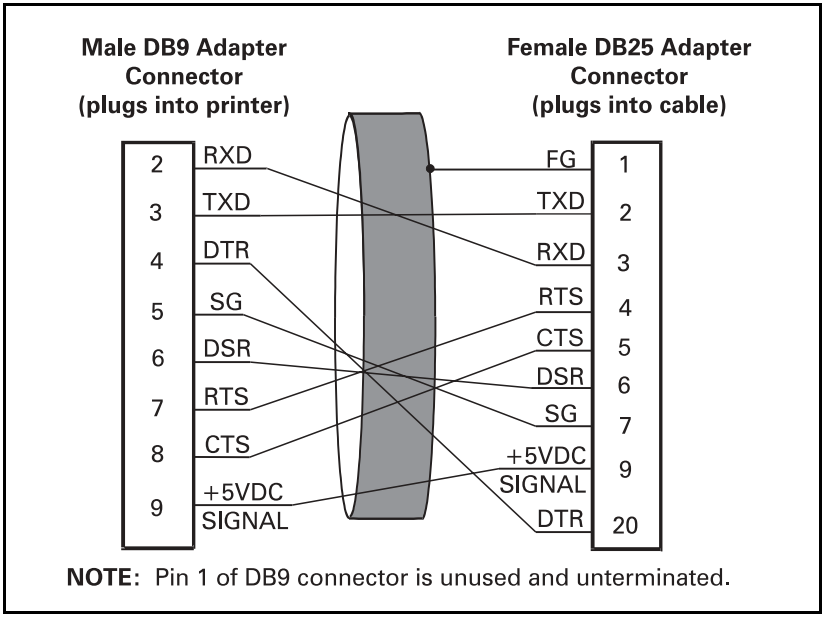


Figure 45

RS-422/RS-485 Interconnections

NOTE: A jumper on the computer's main logic board needs to be installed on JP1, Pins 2 and 3, in order for the RS-422/RS-485 interface adapter to function properly.

To connect the printer's RS-232 DB9 interface to a host computer through an RS-422 or an RS-485 interface, an interface adapter is required (Zebra part # 33130). Figure 46 illustrates the required cable wiring for interconnecting to the interface adapter's DB25 female connector.

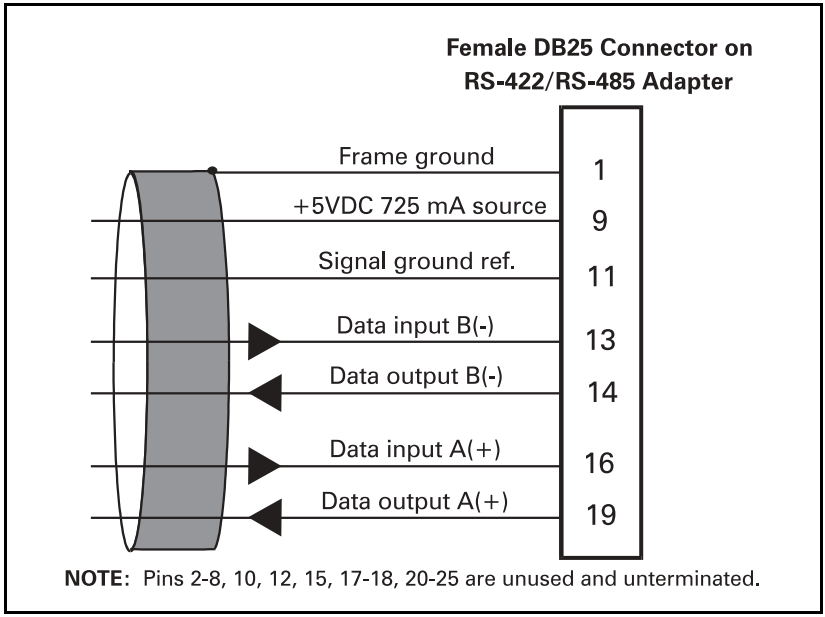


Figure 46

Parallel Data Port

A standard 36-pin parallel connector is available at the rear of the printer for connection to the data source. Under normal circumstances, data sent from the printer to the host computer in response to a "Printer Status Request" command is sent through the RS-232 serial port. However, if the host computer has a properly configured IEEE-1284 parallel port that is recognized by the printer, status information is returned through the parallel port. Port selection for status information is determined each time the printer is turned on.

Parallel Port Interconnections

Table 5 shows the pin configuration and function of a standard computer-to-printer parallel cable.

Table 5

36-pin Connector	Description
1	nStrobe/HostClk
2-9	Data Bits 1-8
10	nACK/PtrClk
11	Busy/PtrBusy
12	PError/ACKDataReq
13	Select/Xflag
14	nAutoFd/HostBusy
15	Not used
16 & 17	Ground
18	+5V @ 750mA
19-30	Ground
31	ninit
32	nFault/NDataAvail
33 & 34	Not used
35	+5V through a 1.8K Ω Resistor
36	NSelectin/1284 active

Appendix C: PCMCIA Card

PCMCIA Card Installation

The PCMCIA card slot is a factory-installed option. If your printer has this option, you may install or change the card at any time. Use the following procedure to install a PCMCIA card.

CAUTION: Observe proper electrostatic safety precautions when handling any static-sensitive components such as printed circuit boards and printheads.

1. Turn the AC power switch in the Off (**O**) position and disconnect the AC power cord. Disconnect the data cables.
2. Refer to Figure 47. Remove and retain the screw and the option card shield from the rear of the printer.
3. If you are replacing the card, press the card eject button and slide the card out of the slot.
4. Slide the new card into the slot far enough that the eject button pops out.
5. Reinstall the option card shield and secure it with the screw.
6. Reconnect the AC power cord and all data cables.
7. Press and hold the FEED key while placing the power switch in the On (**I**) position.
8. Verify the presence of additional memory or optional fonts by checking the information on the configuration label that was printed during the power on sequence.
9. The printer is now ready to operate with the additional memory or font option.

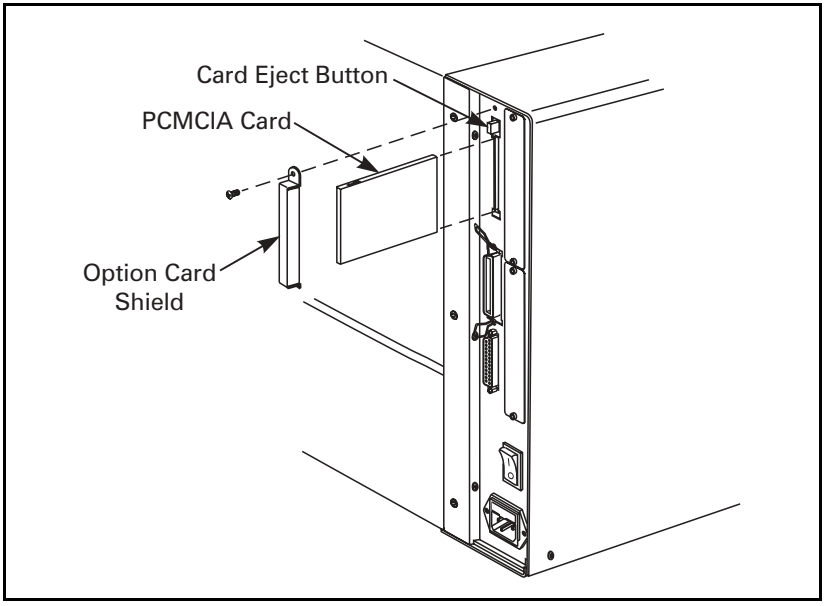


Figure 47

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Printer Products

Printers. All printers (excluding printheads) are warranted against defect in material or workmanship for twelve (12) months from the purchase date.

Proof of purchase or shipment date is required to validate the warranty period. The warranty becomes void if the equipment is modified, improperly installed or used, damaged by accident or neglect, or if any parts are improperly installed or replaced by the user.

Printheads. Since printhead wear is part of normal operation, the original printhead is covered by a limited warranty as indicated below. Warranty period begins on purchase date.

Printhead	Warranty Period
Barcode label printer printheads	6 months
Card printer printheads	12 months

To qualify for this warranty, the printhead must be returned to the factory or to an authorized service center. Customers are not required to purchase Zebra supplies (media and/or ribbons) for warranty qualification. However, if it is determined that the use of other manufacturer supplies has caused any defect in the printhead for which a warranty claim is made, the user is responsible for Zebra's labor and material charges required to repair the defect. The warranty becomes void if the printhead is physically worn or damaged; also if it is determined that failure to follow the preventive maintenance schedule listed in the User's Guide has caused defect in the thermal printhead for which a warranty claim is made.

Software. Software is warranted to be free of defects in material and workmanship for 30 days from the date of purchase. In the event of notification within the warranty period of defects, Zebra will replace the defective diskette or documentation.

Batteries. Mobile printer batteries are warranted to be free of defects in material and workmanship for 90 days from date of purchase. In the event of notification within the warranty period, Zebra will replace the defective battery provided there has not been damage resulting from user abuse.

Supplies Products

Supplies are warranted to be free from defect in material and workmanship for a period of six (6) months for media and twelve (12) months for ribbon from the date of shipment by Zebra. This is provided the user has complied with storage guidelines, handling, and usage of the supplies in Zebra printers.

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12. QUESTIONS. Should you have any questions, or if you desire to contact ZEBRA for any reason, please contact the ZEBRA subsidiary serving your country, or write:

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